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ANTHROPOLOGY.—*Stone "medicine wheels" in southern Alberta and the adjacent portion of Montana: Were they designed as grave markers?* THOMAS F. KEHOE, Museum of the Plains Indian, Browning, Mont. (Communicated by Claude E. Schaeffer.)

During the course of archeological field work in and about the Blackfeet Reservation of Montana I obtained information from a local Indian suggesting a possible explanation of the origin and function of the stone "medicine wheel." Modern Plains archeologists seem inclined to regard the medicine wheel as an aberrant form of tipi ring, without suggesting any plausible explanation of its original purpose.[1] In view of this fact, it seems advisable to record such data as I have been able to collect from various sources on this peculiar archeological phenomenon.

A medicine wheel may be defined for our purpose as a cairn or circle of stone (occasionally concentric circles) from the center of which radiate a series of rows of other stones. Lithic arrangements of this sort are of infrequent occurrence in the Plains area of Montana and Alberta immediately east of the Rocky Mountains. Only two such medicine wheels have been reported to my knowledge within the State of Montana. That such phenomena occur in adjacent states is known, however, by reports from Wyoming and Saskatchewan.

Traditions of certain practices associated with death or burial among the Blackfoot Indians may serve to account for the existence of medicine wheels in those areas formerly occupied by the three tribes. My first clue to these mortuary rites was obtained in 1953 from Adam White Man, an aged South Piegan Indian resident near Browning, Mont. After describing the custom of his forbears in using circles of stones to hold down the bases of their conical skin lodges, Adam was invited to comment upon the sketch of a medicine wheel. His reaction was as follows:

> I heard that when they buried a real chief, one that the people loved, they would pile rocks around the edge of his lodge and then place rows of rocks out from his burial tipi. The rock lines show that everybody went there to get something to eat. He is inviting someone everyday. People went there to live off him. Not every chief is treated like that—just the one loved by everyone. I have never seen this type of stone work but I heard of a chief in Canada who was buried like that.

Similar information was later supplied by Hugh Dempsey, of Edmonton, Alberta (personal letter, 1/8/54) in a statement elicited from an elderly Blood Indian, Harry Mills, of Cardston, Alberta:

> There was a circle of stones used by the Bloods to mark the place where great chiefs or medicine men died. They were bigger than the tipi rings and had five lines [it had been some years since he had seen one, but was fairly certain there were five] leading towards the centre like a wheel. In the middle a fireplace was built.
>
> Red Crow [prominent Blood chief of last century] had one of these on the banks of the Belly River where he died, but these have all been covered up or washed away by floods. There is another one for Running Wolf to mark the place where he died at the Belly Buttes. It's not far from the Sun Dance ground, so I could show it to you if you were at the next Sun Dance.

As noted above Dempsey's informant believed that the medicine wheel was placed to mark the site where a great chief died rather than the actual place of his

[1] Mulloy (1952, p. 137) appears to regard the medicine wheel as a form of tipi ring. Hoffman (1953, p. 2) maintains that tipi rings should be distinguished in form and use, from medicine wheels. Neither he nor Mulloy definitely commit themselves as to the function of either.

burial. Possibly they were used on varying occasions for either purpose. His remarks continue:

> As far as I know, they never buried anybody at these circles of stone; it was just to mark the place where they died. The Bloods also used to mark important sites with cairns of stones. There is a pile of about 30 or 40 stones at the place where Sergeant Wilde was killed by Charcoal [in 1896]. Somebody from the Reserve saw it just last summer. There is also a row of cairns at Whoop-Up at the site of our big fight with the Crees.

John C. Ewers (personal letter, 2/18/54) secured a similar account of the formal marking of chiefs' graves among the Blood tribe from an old Indian, Weasel Tail, since deceased. Weasel Tail was born and spent his early years on the Blood Reserve in Canada but lived the balance of his life on the Blackfoot Reservation in Montana. His interpretation of the four radiating stone lanes differed from Adam White Man's in that they were said to represent great war deeds of the deceased. The relevance of this symbolism is unclear and less plausible than White Man's rationalization.

White men who resided or travelled in the territory of the Blood and North Blackfoot tribes recorded information of the same general tenor. Thus John McLean (1896, p. 579) during visits to Fort McLeod in 1880 came across "medicine wheels" in that region. He comments upon the Indians' use of stone markers to commemorate important events:

> Several great battles were fought, and these cairns were placed there to commemorate these events, and probably to mark the spot where some of their greatest warriors died. When a great chief or warrior died a lodge was placed over him, and when this was thrown down by the wind, the body of the deceased was laid upon the ground, and a cairn of stones erected over it. There is a cairn called by the Indians the "Gambler's Cairn," near the store of I. G. Baker, in the town of Macleod. Several years ago a Piegan camp of Indians located on this spot was attacked by small-pox, and the disease proved so fatal that fifty dead lodges were left standing. Among those who died was Aikûtce; i.e., the Gambler, head chief of the Piegan tribe. His people placed a lodge over him, and when that had been blown down by the western winds, he was reverently laid upon the ground, and the cairn of stones erected. The original cairn was three or four feet in diameter, with rows of stones between forty and fifty feet each in length, leading to the cairn. Only one row of stones remains, and the cairn is worn nearly level with the street. This simple monument is of little interest to the passing stranger; but the Indian riding past will turn to his comrade and say, "Aikûtce."

McLean (p. 580) came across other stone figures in this region but was unable to learn their history from his Indian companions:

> Upon the summit of a limestone hill on Moose Mountain, Assiniboia, there is a group of cairns. The central cairn is composed of loose stones, and measures about thirty feet in diameter and four feet high.
>
> This is surrounded by a heart-shaped figure of stones, having its apex toward the east, and from this radiate six rows of stones, each terminating in a small cairn. Four of these radiating lines nearly correspond with the points of the compass, and each of the lines of different lengths terminate in a smaller cairn. The Indians know nothing of the origin of these lines and cairns, but state that they were made by the spirit of the winds.

George M. Dawson (1885, p. 28C), while engaged in field work for the Canadian Geological Survey in 1882-83-84, encountered a medicine wheel in the High River area of Alberta.[2] He remarks that:

> A point of note to the Indians in this region [the High River area] is that called Sun-dial Hill by Mr. Nelson. There is here a cairn with concentric circles of stones and radiating lines. I have not seen it, and therefore cannot describe it in detail. It is named "Onoka-katzi" and regarded with much reverence.

Although stone tipi rings are still found abundantly on and about the Blackfeet Reservation, the medicine wheel is encountered but rarely in this and adjacent areas. A well-established occurrence is that of the Sun River wheel on the stream of that name near Lowry, Mont. Since the general area has been South Piegan territory from the beginning of the last century, this particular lithic marker may well be Blackfoot in origin. The writer to date has not had an opportunity of examining the Lowry wheel. Accordingly we may refer to a description of it written by the late H.P. Lewis, an amateur collector of Conrad, Mont. Since Lewis was a serious student and conscientious observer, his comments deserve consideration.

[2] I am indebted to Hugh Dempsey, of Edmonton, Alberta, for this reference.

According to Mr. Lewis, this medicine wheel is located on a perfectly flat bench about 30 feet above the north side of Sun River. The bench is gravelly with sparse grass and one mile long by one half a mile wide. The medicine wheel (Fig. 1) is situated in the open a considerable distance from trees or brush. It is directly on the edge of the river bank and portions of the rock alignments have been eroded away by stream action[3] (Lewis, MS.). Lewis describes the "medicine wheel" as follows:

> The artifact [medicine wheel] consists of a central ring 21 feet across, within which, at the center is a second circle 4 feet in diameter. Radiating outward from the larger outer circle are eleven rows of rocks, arranged like the spokes of a wheel. These spokes are only approximately evenly spaced, are roughly of the same length. . . . The lengths vary considerably, as short as twenty-one feet to forty feet. This brings the outer tips of the spokes averaging distances apart, but reaching a maximum on some places of 40 feet. . . . The diameter of the wheel is approximately 100 feet, with a circumference of well over 300 feet. . . . The central four-foot circle gives no sign of being used for fire. It will be noticed that [four spokes] lie closely along the four principle points of the compass. . . .
>
> Absence of tepee rings (except as hereafter noted) is glaringly noticeable. Very evidently the place was not a camp site. The exceptions to be noted lie about a hundred yards east of the wheel, consist of a group of only four average-sized tepee rings. These rings differ from ordinary camp site tepee rings only in having short rows of rocks, set as though bordering an entry walk, and extending to the east. Two of the rings had this feature, the other two did not. . . .

[3] I was unable to check the copy of the H. P. Lewis Ms., which is deposited with the River Basin Surveys, Lincoln, Nebr., with the original.

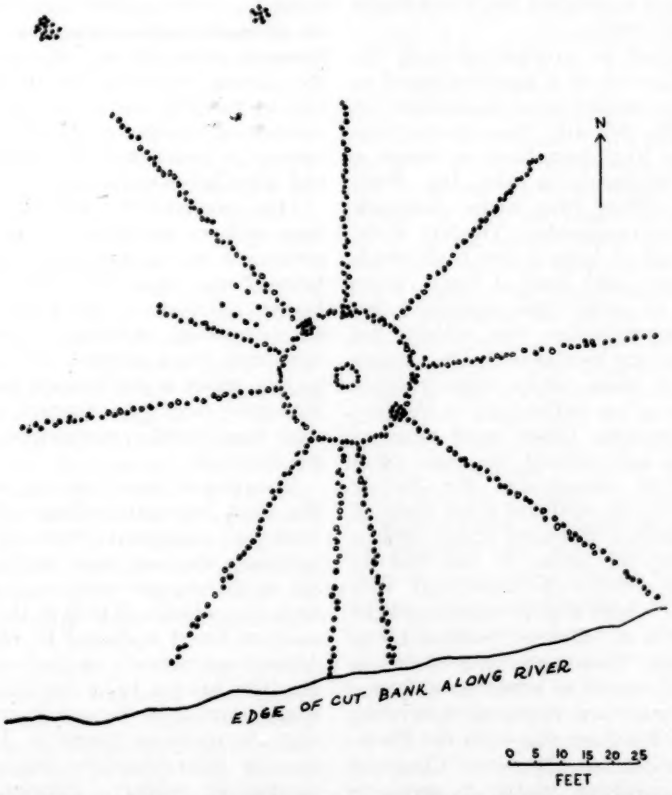


FIG. 1.—The Sun River Medicine Wheel, Lowry, Mont. (Sketch adapted, with omission of details, from H. P. Lewis manuscript.)

We should not overlook the fact that the Medicine Wheel is in the very heart of the buffalo drive country. The Williams [buffalo] Kill is directly across the River, the Eder slightly to the east.

A second medicine wheel is said to have been located a short distance west of the town of Armstead, south of Dillon, Montana. The description details of this stone figure are somewhat obscure but it differs from those mentioned above in its apparent association with petroglyphs. Our source (Montana State Guide, pp. 32, 292) states that "behind the first large red butte are lines of stone running from it across the valley like spokes radiating from a hub. At the foot of the butte are crude paintings in the center of a large ring of rocks. . . ." Although the location of this medicine wheel appears well beyond the confines of former Piegan territory, Blackfoot raiders are known to have penetrated the Three Forks region in the 1830's.

Farther afield an interpretation of the origin and function of a medicine wheel in Wyoming was secured some decades ago by Grinnell (1922, 299–310) from other ethnic sources. This large assemblage of stones, a prominent landmark in the Big Horn Mountains, differs from those discussed above in certain particulars. The hub of the circle is a wall of large stones from which radiate twenty-eight lines of small stones terminating at rather than projecting beyond the circumference. Just without the circumference are located four, low circular enclosures of stone which were roughly oriented, according to Grinnell, in the four cardinal directions. Other small rings of stone within and without the main circle completed the assemblage. For further information on the medicine wheel Grinnell turned to Indians of several tribes resident in and about this area. He was told by elderly Cheyenne, well acquainted with the medicine wheel, that it represented the ground plan of an old time Medicine Lodge of their people. Their explanation of various parts of the wheel in terms of a former ceremonial structure appeared convincing to Grinnell. The facts that both the Blackfoot and the linguistically related Cheyenne interpreted medicine wheels in terms of structures, the one mortuary, the other ceremonial, basic to their former cultures, suggest that the concepts underlying them were not unrelated.

We may refer briefly to another point in connection with the medicine wheel in Blackfoot territory. Adam White Man explained that the four spokelike extensions from the stone circle was their representations of paths trod by followers of the deceased coming to partake of his bountiful hospitality. That such a concept was meaningful in the value-system of the Blackfoot is attested by the calls to share food and tobacco frequently issued by chiefs in the camp circles of former days. In contrast, Weasel Tail identified the stone radii as representative of the dead chief's war deeds. What may really be involved, however, beneath these native rationalizations is an expression of the idea of orienting and marking a place of death or burial according to the cardinal directions. Emphasis upon directional symbolism is not unknown in other aspects of Blackfoot religious life, being expressed in medicine pipe rituals, the Sun Dance, etc. Even greater ceremonial attachment to this widespread concept is manifested by Dakota, Pawnee and other tribes to the east.

This concludes the data which we have been able to assemble in respect to the peculiar stone configurations of the Montana-Alberta area. No doubt there are further references in the literature as well as unrecorded medicine wheels in the field that have escaped our notice. The present paper is preliminary, however, and represents merely an attempt to introduce some meaning into an otherwise obscure and puzzling topic.

In summary, then, testimony advanced by Blackfoot informants suggest the employment at infrequent intervals of native mortuary practices which might have given rise to the strange configurations known as medicine wheels. Whether the few lithic markers found scattered in Montana and Alberta can actually be derived from such practices has yet to be determined. If such would prove to be the case, it would indicate that the medicine wheels in Montana are scarcely older than the beginning of the nineteenth century. Further, such an explanation, it should be pointed out, cannot be applied to these phenomena through-

out their area of distribution, whatever that may prove to be, but only to those situated in what was formerly Blackfoot territory. Those located beyond this region must obviously be studied independently and in terms of the native cultures of their own areas.

BIBLIOGRAPHY

DAWSON, GEORGE M. *Report on the region in the vicinity of Bow and Belly River, North West Territory.* Report of Progress, 1882-83-84. Geological and Natural History Survey of Canada. Ottawa, 1885.

GRINNELL, GEORGE BIRD. *The medicine wheel.* Amer. Anthrop., n.s., **24** (3): 299-310. 1922.

HOFFMAN, J. JACOB. *Comments on the use and distribution of tipi rings in Montana, North Dakota, South Dakota, and Wyoming.* Anthrop. and Sociol. Pap. Montana State Univ. 14. 1953.

LEWIS, H. P. MS. on *Bison kills in Montana.* (Copy in Missouri River Basin Archeological Survey Offices, Lincoln, Nebr.).

MCLEAN, JOHN. *Canadian savage folk.* Toronto, 1896.

Montana: A State guide book. (Federal Writers' Project of WPA for State of Montana. New York, 1939).

MULLOY, WILLIAM T. *The Northern Plains.* In "Archeology of Eastern United States," edited by James B. Griffin. Chicago, 1952.

PALEONTOLOGY.—*On the pelecypod genus* Platopis *Whitfield: III.* H. E. VOKES, Johns Hopkins University.

In 1946 I gave an extended consideration of Whitfield's genus *Platopis* (1891, p. 399), noting that Whitfield had designated two of Conrad's Syrian species as types, neither of which he had at hand and both of which he had misinterpreted. Concluding that the selection of two species as types was, in effect, no selection at all, I designated *P. plicata*, one of the species described by Whitfield, since it seemed most probable that it was upon this species that he had based his generic description.

Then, in 1952, I reported that work in preparation for the *Treatise on invertebrate paleontology* had revealed the fact that Woodward, in the Zoological Record for 1891 [1892] had selected "*P.* [*Opis*] *undata* Conr." as type. This being one of the two species originally cited by Whitfield, was clearly a valid designation. But "*Opis*" *undata* Conrad is a prior name for the form that is variously called *Roudairia auressensis* (Coquand) and *R. drui* Munier-Chalmas; the latter being the type species of *Roudairia* Munier-Chalmas, 1881. The Woodward designation therefore made *Platopis* a subjective synonym of *Roudairia*.

The species typified by "*Platopis*" *plicata* do not, however, represent the genus *Roudairia*. In my earlier papers I pointed out that while the hinge was quite similar to that of *Eocallista* Douville, they seemed to differ consistently in shape. In 1952, I therefore concluded: "I am not acquainted with any species at present referred to *Eocallista* that show the markedly triangular shape and strong unbonal carination of the species that I previously referred to *Platopis*. However, Cox (1944, p. 105) states that forms resembling some species of *Pronoella* in external characteristics 'may, however, belong to such genera as *Isocyprina* and *Eocallista*.' It seems best, therefore, at present to refer the Lebanon species listed above to the genus *Eocallista, sensu lato*, pending possible future studies of species of that genus not at present available to me."

The purpose of the present note is to call attention to the fact that in his recent monograph on "The Larger Invertebrate Fossils of the Woodbine Formation (Cenomanian) of Texas" Dr. L. W. Stephenson described a new genus *Pharodina* type *P. ferrana* Stephenson (1953, p. 109, pl. 27, figs. 1–7) that is clearly synonymous with *Platopis* as I first interpreted it and is therefore available as a substitute name for the group of species that I typified by "*Platopis*" *plicata*. The only observable difference seems to lie in the fact that the posteroventral umbonal slope is subangulate in *P. ferrana*, rather than carinate as it is in *P. plicata*.

The presence of posterior lateral dentition and the absence of a pallial sinus refer to this genus to the Arcticidae (Cyprinidae) rather than to the Veneridae, where it was assigned by Stephenson.

REFERENCES

Cox, L. R. *On the Jurassic lamellibranch genera* Hartwellia *and* Pronoella. Geol. Mag. **81** (3), 100–112, 4 text figs. 1944.

Stephenson, Lloyd William. *Larger invertebrate fossils of the Woodbine formation (Cenomanian) of Texas.* U.S. Geol. Surv. Prof. Pap. 242: iv + 226 pp., 59 pls., 8 text figs. 1952 [1953].

Vokes, H. E. *Contributions to the paleontology of the Lebanon Mountains, Republic of Lebanon. Part 3: The pelecypod fauna of the "Olive Locality" (Aptian) at Abeih.* Bull. Amer. Mus. Nat. Hist. **87** (3): 139–216, 10 pls., 1 text fig. 1946.

———. *Notes on the pelecypod genus* Platopis *Whitfield.* Amer. Mus. Nov. 1560: 3 pp. 1952.

Whitfield, Robert Parr. *Observations on some Cretaceous fossils from the Beyrut district of Syria, in the collections of the American Museum of Natural History, with descriptions of some new species.* Bull. Amer. Mus. Nat. Hist. **3**: 381–441, pls. 4a–11. 1891.

ZOOLOGY.—*Fresh-water Ostracoda from Texas and Mexico.* Willis L. Tressler, U. S. Navy Hydrographic Office.

The fresh-water Ostracoda of Texas have received very little attention and as a result are practically unknown. Many years ago William Baird (1862) described *Chlamydotheca texasiensis* from some material sent him from Texas, and to the best of my knowledge this remains the sole valid ostracod record for the State. The present paper reports on 13 ostracod species new to Texas, 6 of which appear to be new species. A number of species of fresh-water Ostracoda have been reported from Mexico commencing with de Saussure who described *Chlamydotheca azteca* from Mexico in 1858 (Saussure, 1858), down to one of the most recent workers, Dr. Rioja, who has added several new species to the peculiar genus Entocythere, all of whose members are parasitic or commensal on the gills of fresh-water crayfish (Rioja, 1940a, 1940b, 1942, 1944). The species previously known from Mexico proper include *Physocypria dentifera* (Sharpe), *P. denticulata* (Daday), *Cyprinotus pellucidus* Sharpe, *Eucypris fuscatus* (Jurine), *E. virens* (Jurine), *Chlamydotheca azteca* (Saussure), *C. arcuata* (Sars), *C. mexicana* Sharpe, *Cypricerus affinis* (Fischer), *Potamocypris smaragdina* (Vavra), *Entocythere heterodonta* Rioja, *E. sinuosa* Rioja, *E. claytonhoffi* Rioja, *E. dobbinae* Rioja, and *E. mexicana* Rioja. The present paper adds four species to the record and of these, three species appear to be new to science.

Three locations in east Texas produced four species; five lakes in west Texas, from which ecological factors are known, produced eight species; six small pools also in west Texas had six species of Ostracoda; one location in south Texas had one species; and two lakes which were visited in Mexico, yielded four species. A tabulation of the species collected in each locality is shown in Table 1.

There are now over 200 known species of fresh-water Ostracoda in North America (Tressler, in press), and many of these are undoubtedly present in Texas and adjoining regions of Mexico. Future workers in these regions, have accordingly, an almost virgin territory in which to work as far as the fresh-water Ostracoda are concerned.

The material for the present report was collected by Dr. Edward S. Deevey, of Yale University, while an instructor at the Rice Institute, during trips in the western part of Texas and parts of Mexico in 1940 and 1941. Some material is also included which was sent by Miss Marcile Patterson, of the Texas Game, Fish, and Oyster Commission, and which contained additional specimens of three species collected by Dr. Deevey.

The slides of the dissected specimens from which the camera lucida drawings were made, have been deposited in the U. S. National Museum as type specimens.

Ecological data for some of the regions have been very kindly furnished by Dr. Deevey. A summary of these data, together with the species of Ostracoda found in each locality are presented in Table 1. Because of the incompleteness of the biological and ecological data, no broad conclusions can be drawn as to the ecological distribution of the species collected. It is to be noted, however, that the cosmopolitan species *Cypridopsis vidua* is to be found under a wide variety of conditions running from strictly fresh-water to the highly saline waters of salt flats. The brackish-water species, *Cyprinotus sa-*

linus, as its name indicates, is always found in saline waters.

Suborder PODOCOPA

Family Cypridae: Subfamily Candocyprinae

Genus **Cypria** Zenker, 1854

Valves compressed, very thin when viewed from above. Margins of valves smooth. Color of valves usually yellow to brown and spotted. Natatory setae of second antenna well developed and extending considerably beyond tips of terminal claws. Terminal segment of third thoracic leg short and with two forwardly directed setae and one reflexed seta. Furca moderately developed, dorsal seta sometimes rudimentary or absent.

Cypria lacustris Sars, 1891

Fig. 1

Cypria lacustris G. O. Sars, Forh. Selsk. Christiania 1890 (1): 64. 1891.
Cypria lacustris G. S. Brady and A. M. Norman, Trans. Roy. Dublin Soc. (2) **5**: 719. 1896.
Cypria lacustris G. O. Sars, Crust. Norway, IX: Ostracoda: 98. 1928.

Specific characters.—Female: Shell subovoval in shape, greatest height slightly greater than two-thirds the length. Dorsal margin evenly curved, ventral margin slightly sinuated, both extremities evenly rounded. From above, narrow, with greatest width about one third the length. Valves very clear, with smooth and polished surfaces, pigment spots entirely lacking, broad hyaline borders anteriorly and posteriorly. Caudal furca slender and slightly curved; distal claw amounting to about one-half the length of the ramus. Length 0.60 mm, height 0.42 mm. Color, transparent white with a yellowish tinge.

Male: Smaller than the female, posterior portion of shell broader. Right prehensile palp abruptly expanded at the end; left palp narrowed at outer end.

Occurrence.—One female was identified from collections made in Fern Bog, Big Thicket, Polk County, Tex., on May 12, 1940.

Distribution.—Originally reported from Sweden, this species has been found in the Northwest Territories and in Michigan.

Genus **Candona** Baird, 1842

Shells of a whitish color with smooth valves which are sometimes covered with scattered puncta. Eye poorly developed or absent. Terminal segment of maxillary palp broader than long. Third thoracic leg four or five-segmented depending upon whether penultimate segment is divided or not; terminal segment short with three unequal setae. Furca well developed. Ejaculatory duct with five whorls of spines.

Candona intermedia Furtos, 1933

Figs. 2, 3

Candona intermedia N. C. Furtos, Ohio Biol. Surv. **5** (6): 474. 1933.

Specific characters.—Female: Seen from the side, elongated, height about one-half the length, highest in posterior third. Posterior extremity with a sharp posteroventral angle. Ventral margin slightly sinuated in the middle, convex anteriorly, slightly sinuated anterior to the posteroventral angle. Seen from above, eliptical, width less than one-half length, left valve projects beyond right at both extremities. Surface of valves sparsely hairy. Medial-distal seta of penultimate segment of mandibular palp plumose. Penultimate segment of third thoracic leg divided. Furca slender, sixteen times longer than narrowest width; claws coarsely denticulated. Length 1.7 mm, height 0.92 mm, width 0.73 mm.

Male: Somewhat longer than female; posterior extremity lacks the angle. Right prehensile palp elongated, left palp shorter, stouter. Furca straight, seventeen times longer than narrowest width.

Remarks.—This species may be distinguished from *Candona caudata* Kaufmann by its greater size and the plumose mandibular seta, which is smooth in *C. caudata*.

Occurrence.—Two immature specimens were taken from Balmorhea Lake, Reeves County, Tex., at a depth of 4.5 meters on June 21, 1940, and one female was sent from an unknown location in Texas by Miss Marcile Patterson.

Distribution.—In Ohio, where this species was originally described, it was found in cold, clear waters during May and June.

Candona patzcuaro, n. sp.

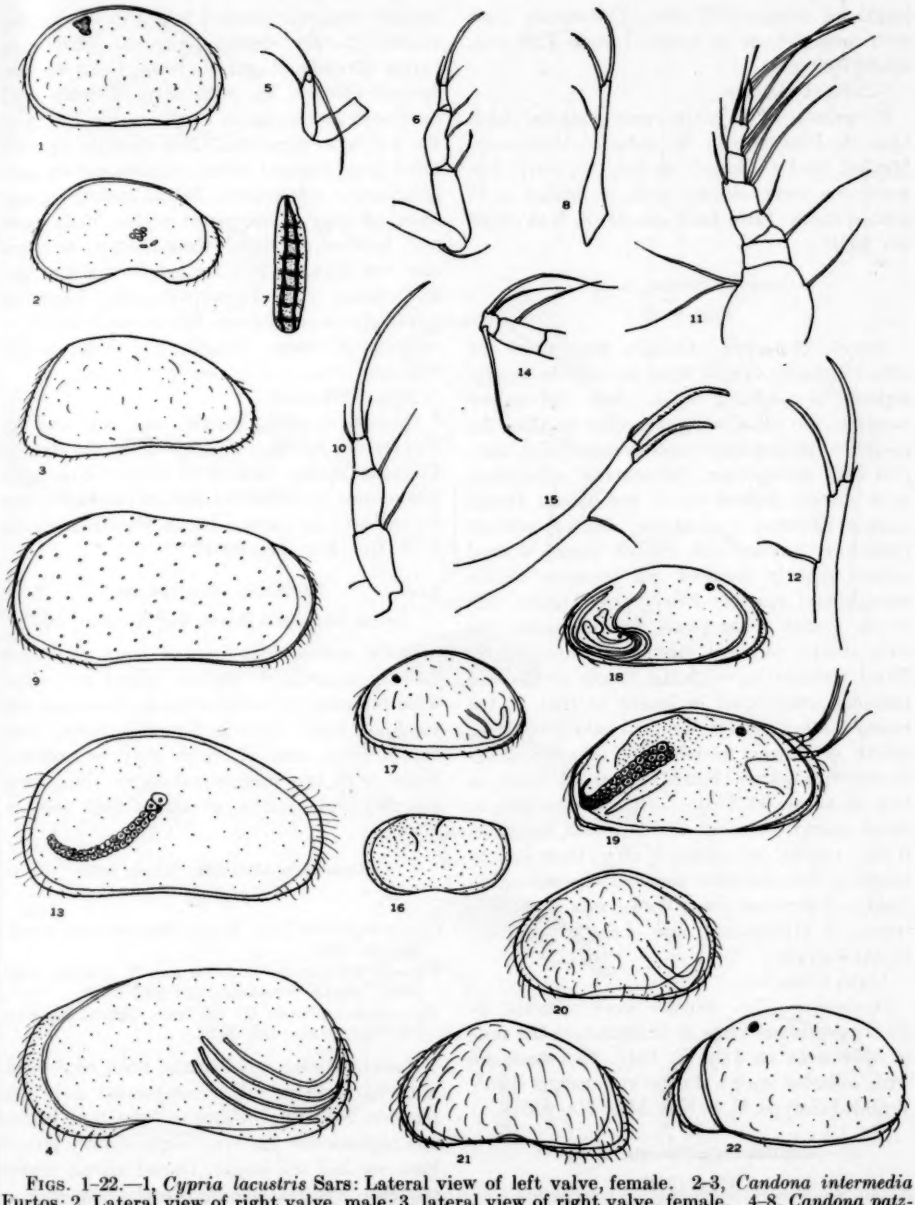
Figs. 4–8

Specific characters.—Male: Seen from the side, elongated, height slightly greater than one-half the length; both ends rounded, the posterior more evenly and broadly. A distinct indentation at the anterodorsal margin and a sharp angle at the anteroventral margin are present. Dorsal margin rounded; ventral margin deeply indented

posterior to the anteroventral angle. Valves smooth and sparsely hairy. Color whitish. Second thoracic leg with a rather short terminal claw. Third thoracic leg with two nearly equal terminal setae and one longer, reflexed seta; penultimate segment indented but not distinctly divided. Furcal ramus twenty times length of narrowest width; terminal claw about one-half the length of ramus; subterminal claw seven-tenths length of terminal claw; both claws finely toothed in their distal halves; terminal seta absent in the specimens observed; dorsal seta six-sevenths

TABLE 1.—ECOLOGICAL DATA ON FRESH-WATER OSTROCODA FROM TEXAS AND MEXICO

Locality and Species	Cl mg/l	SiO_2 mg/l	Total P. mg/m³	Total N mg/l	HCO_3 mg/l	SO_4 mg/l
East Texas						
FERN BOG, BIG THICKET		(No ecological data)				
Herpetocypris pattersoni						
Cypria lacustris						
POOL NEAR SARATOGA						
Limnocythere sancti-patrici						
SAN JACINTO RIVER BOTTOM						
Cypridopsis potamis						
West Texas						
BALMORHEA LAKE	560	16.3	85	0.484	158.6	555
Candona intermedia						
Ilyocypris biplicata						
Cypridopsis vidua						
PHANTOM LAKE	693	15.7	6	4.484	282.2	625
Chlamydotheca texasiensis						
Cypridopsis phantomensis						
Cypridopsis musquizensis						
Cypridopsis toyensis						
FORT STOCKTON LAKE	378	23.6	45	0.632	153.7	968
Cypridopsis vidua						
FINDLAY SPRING	5.8	12.6	65	0.931	156.1	61.6
Cyprinotus dentatus						
TOYAH LAKE	485	11.3	46.5	0.702	54.5	1540
Cypridopsis toyensis						
Cypridopsis musquizensis						
FERN CANYON	24.5	47.6	148.0	1.249	90.1	1
Herpetocypris pattersoni						
LIMPIA CREEK	(Small pools, no ecological data)					
Herpetocypris pattersoni						
MUSQUIZ CREEK						
Herpetocypris pattersoni						
Cypridopsis musquizensis						
BELL CANYON						
Cypridopsis vidua						
Candonocypris deeveyi						
SALT FLAT DITCH						
Cypridopsis vidua						
Potamocypris smaragdina						
TANK, SALT BASIN	(Very saline water)					
Potamocypris smaragdina						
Cypridopsis vidua						
Cyprinotus salinus						
BALMORHEA IRRIGATION DITCH						
Cypridopsis vidua						
South Texas						
LAKE NO. 3, KLEEBERG COUNTY	21.00				53.5	
Candonocypris deeveyi						
Mexico						
LAGO DE PATZCUARO	21.3	14	19.5	(organic) 0.586	458	0.2
Candona patzcuaro						
Candona michoa						
PRESA DE HIPOLITO	17.05	10	90.0	0.705	86.8	24.0
Cypridopsis vidua						
Candona hipolitensis						



FIGS. 1–22.—1, *Cypria lacustris* Sars: Lateral view of left valve, female. 2–3, *Candona intermedia* Furtos: 2, Lateral view of right valve, male; 3, lateral view of right valve, female. 4–8, *Candona patzcuaro*, n. sp.,: 4, lateral view of left valve, male; 5, third thoracic leg, male; 6, second thoracic leg, male; 7, ejaculatory duct, male; 8, furca, male. 9–12, *Candona michoa*, n. sp., 9, lateral view of left valve, female; 10, second thoracic leg, female; 11, first antenna, female; 12, furca, female. 13–15, *Candona hipolitensis*, n. sp., 13, lateral view of right valve, female; 14, terminal portion of third thoracic leg, female; 15, furca, female. 16, *Ilyocypris biplicata* Koch, lateral view of left valve, female. 17, *Cyprinotus salinus* (Brady), lateral view of left valve, female. 18–19, *Cyprinotus dentatus* Sharpe, 18, lateral view of right valve, male; 19, lateral view of right valve, female. 20, *Cypridopsis vidua* (O. F. Müller), lateral view of left valve, female. 21, *Potamocypris smaragdina* (Vavra), lateral view of left valve, female. 22, *Chlamydotheca texasiensis* (Baird), lateral view of left valve, female.

length of subterminal claw. Ejaculatory duct with seven whorls of spines. Length 1.30 mm, height 0.68 mm.

Female: Unknown.

Occurrence.—Two males were collected from Lago de Patzcuaro in the state of Michoacán, Mexico, by Dr. Deevey on July 10, 1941. The specimens were secured with a dredge at 4 meters depth. Male holotype, U. S. Nat. Mus. No. 96047.

Candona michoa, n. sp.

Figs. 9–12

Specific characters.—Female: Seen from the side, elongated; height equal to half the length, highest in posterior third. Both extremities rounded, the anterior more evenly so than the posterior. Anterodorsal and posterodorsal margins with indentations, the anterior indentation more sharply defined but of less extent. Dorsal margin flattened and gently sloping upward posteriorly toward the highest point; ventral margin slightly sinuated and concave. Valves smooth and sparsely hairy. Color white. Antennae typical of the genus. Second thoracic leg with slender terminal claw of medium length. Third thoracic leg with the longer of the two terminal setae equal in length to that of the reflexed seta; shorter terminal seta two-thirds length of longer; penultimate segment indistinctly subdivided. Furcal ramus 16 times as long as narrowest width; both claws smooth or finely haired; terminal claw one-half length of furcal ramus; subterminal claw three-fourths length of terminal claw; terminal seta one-eighth length of terminal claw; dorsal seta two-thirds length of subterminal claw. Length 1.16 mm, height 0.58 mm.

Male: Unknown.

Occurrence.—Two females were collected by Dr. Deevey from Lago de Patzcuaro in the state of Michoacán on July 10, 1941. The specimens were collected with a dredge at 4 meters depth. Female holotype, U. S. Nat. Mus. No. 96048.

Candona hipolitensis, n. sp.

Figs. 13–15

Specific characters.—Female: Seen from the side, elongate, height definitely greater than one-half length. Both ends rounded, the anterior more evenly than the posterior. Posterior extremity with a rounded angle three-fourths the distance to the dorsal margin. Dorsal margin broadly rounded; greatest height in the middle; ventral margin slightly concave. Surface of valves smooth and sparsely hairy. Color whitish. Second thoracic leg with terminal claw well developed and equal in length to the length of the last three segments. Third thoracic leg with three long, unequal setae; penultimate segment indistinctly subdivided. Furcal ramus sixteen times as long as narrowest width; both claws well toothed in distal three-fourths; terminal claw less than one-half the length of the ramus; subterminal claw six-sevenths the length of terminal claw; dorsal seta four-sevenths length of subterminal claw. Length 1.16 mm, height 0.62 mm.

Male: Unknown.

Occurrence:—One female was collected by Dr. Deevey in Presa de Hipolito in the state of Coahuila, Mexico, on June 19, 1940. The specimen was secured at a depth of one and one-half meters by means of the Ekman dredge. Female holotype, U. S. Nat. Mus. No. 96049.

Subfamily Ilyocyprinae

Genus **Ilyocypris** Brady and Norman, 1889

Shells oblong with one or more transverse median depressions; surface pitted and often with tubercles or protuberances. Terminal segment of third thoracic leg with three, long, simple setae, one of which may be reflexed. Furca with two long, equal claws; dorsal seta attached near middle of ramus and well developed.

Ilyocypris biplicata (Koch, 1838)

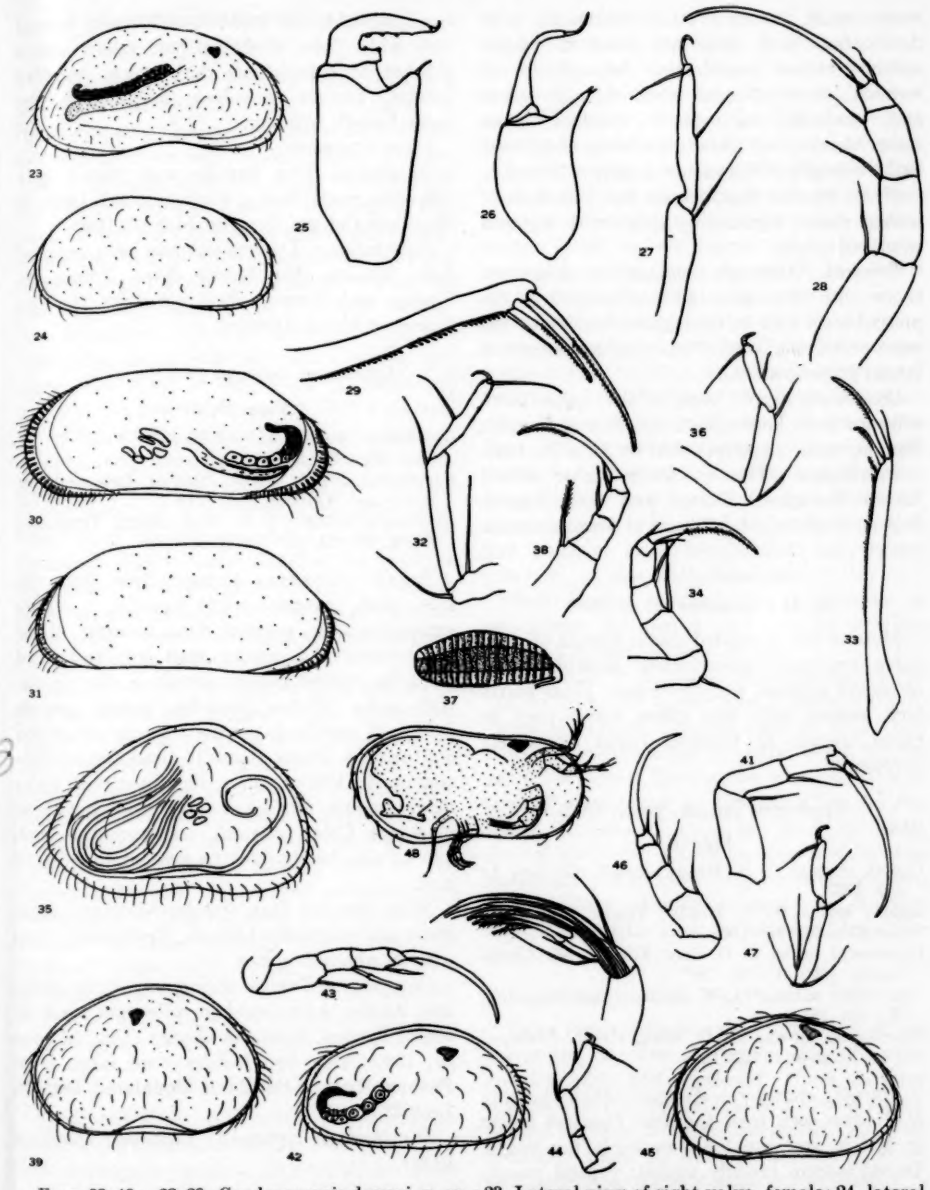
Fig. 16

Cypris biplicata C. L. Koch, Deutschlands Crust. **21** (16). 1838.

Ilyocypris biplicata T. Scott and R. Duthie, Rep. Fish. Board. Scotland. **15**: 330. 1897.

Ilyocypris biplicata G. O. Sars, Crust. Norway, IX: Ostracoda: 106. 1928.

Specific characters.—Female: Shell oval quadrangular in shape rather compressed seen from the side. Somewhat higher in front than behind and highest near the eye; height slightly greater than one-half the length. Dorsal margin almost straight; ventral margin deeply sinuated in middle. Two vertical folds are very conspicuous features in the front part of the valves. No lateral protuberances. Anterior and posterior valve edges denticulated, those of the anterior region being more crowded. Color, opaque, whitish gray. Surface of valves granular with



FIGS. 23–48.—23–29, *Candonocypris deeveyi*, n. sp.: 23, Lateral view of right valve, female; 24, lateral view of right valve, male; 25, 26, prehensile palps, male; 27, third thoracic leg, female; 28, second thoracic leg, female; 29, furca, male. 30–34, *Herpetocypris pattersoni*, n. sp.: 30, Lateral view of left valve, female; 31, lateral view of left valve, male; 32, third thoracic leg, female; 33, furca, female; 34, second thoracic leg, female. 35–38, *Cypridopsis phantomensis*, n. sp.: 35, Lateral view of right valve, male; 36, third thoracic leg, male; 37, ejaculatory duct, male; 38, second thoracic leg, male. 39–41, *Cypridopsis musquizensis*, n. sp.: 39, Lateral view of left valve, male; 40, second antenna, male; 41, second thoracic leg, male. 42–44, *Cypridopsis toyensis*, n. sp.: 42, Lateral view of right valve, female; 43, second thoracic leg, female; 44, third thoracic leg, female. 45–47, *Cypridopsis potamis*, n. sp.: 45, lateral view of right valve, female; 46, second thoracic leg, female; 47, third thoracic leg, female. 48, *Limnocythere sanctipatrici* Brady and Robertson, lateral view of entire animal in left valve, male.

many small, rounded pits. Extremities with dense, fine hairs. Natatory setae of second antenna extend considerably beyond tips of terminal claws. Caudal furca slightly curved and gradually attenuated; terminal claws rather slender; the distal claw being about one-half the length of the ramus. Length 1.10 mm.

Male: Smaller than female but otherwise of similar shape. Ejaculatory tubes with eighteen whorls of spines.

Remarks.—Although combined by some authors with *Ilyocypris gibba* (Ramdohr), the present form may be distinguished easily by the more prominent lateral folds and the absence of lateral protuberances.

Occurrence: Empty shells of this species were collected from Balmorhea Lake, Reeves County, Tex. in water 4.5 meters deep on June 21, 1940.

Distribution.—This species is rather widely known throughout Europe and from Algeria. It is reported for the first time in North America.

Subfamily Cyprinae

Genus **Cyprinotus** Brady, 1885

More or less elongated shells; margin of right valve commonly tuberculated. Natatory setae of second antenna well developed. Third maxillary process with two spines which may be either smooth or toothed. Furca moderately developed.

Cyprinotus salinus (Brady 1862)

Fig. 17

Cypris strigata G. S. Brady, Intell. Observ. **1**: 452. 1862.
Cypris salina G. S. Brady, Trans. Linn. Soc. London. **26**: 368. 1868.
Cyprinotus salina G. O. Sars, Forh. Selsk. Christiania. 1890 (1): 56. 1891.
Cyprinotus salinus G. W. Müller, Das Tierreich, **31**: 165. 1912.
Cyprinotus salinus G. O. Sars, Crust. Norway, IX: Ostracoda: 122. 1928.

Specific characters.—Female: Shell broadly oval when seen from the side. Greatest height in middle and equal to two-thirds the length. Dorsal margin broadly arched; ventral margin somewhat sinuated; posterior extremity conspicuously produced into a rounded expansion. Seen from above, width slightly less than one-half the length. Valves very unequal, left valve overlaps the right. Denticles of right valve small and crowded. Natatory setae of second antenna extend to tips of terminal claws. Caudal rami small, straight, and gradually attenuated toward their ends. Color of shell a pale yellow with a number of conspicuous dark-brown, bandlike patches. Surface of valves smooth with fine hairs. Length 1.25 mm.

Male: Unknown.

Occurrence.—Five females were found in a collection made from a tank in a salt basin in Hudspeth County, Tex., on June 10, 1940.

Distribution.—This species has been reported from Sweden, the British Isles, Pomerania, France, and Norway; it is noted for the first time from North America.

Cyprinotus dentatus (Sharpe, 1910)

Figs. 18, 19

Cyprinotus dentata R. W. Sharpe, Proc. U. S. Nat. Mus. **38**: 336. 1910.
Cyprinotus dentata R. W. Sharpe, Ostracoda in Ward and Whipple: 816. 1918.
Cyprinotus dentatus C. C. Hoff, Journ. Tennessee Acad. Sci. **18** (1): 102. 1943.

Specific characters.—Female; Seen from the side, shell margins nearly parallel; posterior extremity more pointed than anterior. Right valve somewhat smaller than left and lined along its ventral margin, except in the middle, with some 60 fine denticles, closely spaced. Spines of maxillary process strongly developed and toothed. Furca about 16 times longer than narrowest width of ramus; slightly curved; claws nearly smooth. Surface of valves smooth with no markings. Color yellowish, transparent. Length 1.3–1.4 mm, height 0.5–0.65 mm, width 0.5–0.58 mm.

Male: Smaller than female. Maxillary palps stout and decidedly hooked. Ejaculatory duct with 26 whorls of spines.

Occurrence.—Twelve specimens, both males and females, were found in collections made in Finlay Springs, Hudspeth County, Tex., on June 23, 1940. Also, two females were taken from Phantom Lake in the Davis Mountains, Tex., on June 23, 1940.

Distribution.—Nebraska, Tennessee (Reelfoot Lake).

Genus **Candonocypris** Sars, 1895

Elongated shells of large size with valve margins either smooth or serrated. Natatory setae of second antenna not very well developed. two maxillary spines well toothed. Furca well developed; dorsal margin generally denticulated.

Candonocypris deeveyi, n. sp.

Figs. 23–29

Specific characters.—Female: Seen from the side, elongated oval in shape; height equal to half the length; highest in posterior third. Posterior end more broadly rounded than anterior with a concavity near the upper two-thirds of the posterior margin. Anterior end with a distinct furrow on the anterodorsal margin. Dorsal margin rounded; ventral margin sinuated and concave in the middle. Valves smooth with a few scattered, long hairs; edges of valves smooth. Eye prominent. Color of preserved specimen brown. Second thoracic leg with a slender terminal claw equal in length to the combined length of the last three segments. Third thoracic leg with a slender terminal claw and one short, reflexed seta; penultimate segment undivided. Furca well developed; subterminal claw slightly longer than half the length of terminal claw; both claws toothed on distal three-fourths; dorsal seta slightly longer than half the length of subterminal claw; terminal seta equal in length to dorsal seta or one-fourth length of terminal claw; dorsal margin of ramus heavily toothed. Length 3.26 mm, height 1.63 mm.

Male: Seen from the side, elongate and not so high as the female; greatest height in posterior quarter and equal to about three-sevenths of the length. Posterodorsal concavity indistinct; anterior dorsal furrow prominent. Ventral margin slightly concave. Length 3.26 mm, height 1.47 mm.

Occurrence: Four females were collected from Lake No. 3 in Kleiberg County, Tex., by Dr. Deevey on June 30, 1941. Several male specimens were sent in by Miss Patterson from an unknown location in Texas, possibly from Dalhart in Dallam County, north Texas, where they were collected in the spring of 1940. Female holotype, U. S. Nat. Mus. No. 96050; male paratype, U. S. Nat. Mus. No. 96051.

Genus **Herpetocypris** Brady and Norman, 1889

Elongated shells with scattered puncta between which are smaller puncta. Maxillary spines well developed; terminal segment of maxillary palp widened distally. Furca strongly developed terminal claw appreciably shorter than one-half the length of the ramus.

Herpetocypris pattersoni, n. sp.

Figs. 30–34

Specific characters.—Female: Seen from the side, elongated, greatest height in posterior third of shell and appreciably less than one-half the length of the shell. Dorsal margin flattened and gently sloping toward anterior end. Ventral margin slightly sinuated. Anterior extremity broadly and evenly rounded; posterior extremity narrowly rounded and somewhat produced in the ventral half; dorsal half sloping steeply posteriorly. Pore canals prominent in anterior margin. Shell sparsely hairy with a few long, stout hairs at posterior extremity. Left valve larger than right. Natatory setae of second antenna do not reach to tips of terminal claws. Second thoracic leg with heavy, well developed terminal claw which is toothed along its distal two-thirds. Third thoracic leg with one short claw and a long, backwardly directed seta. Furca with ramus 16 times longer than narrowest width; five groups of hairs along dorsal margin; posterior claw barely one-half length of anterior claw; terminal bristle slightly longer than one-half posterior claw. Length 2.20 mm, height 0.90 mm.

Male: Similar in shape and in structure of appendages to female but slightly smaller. Length 2.12 mm, height 0.73 mm.

Occurrence. Four females were collected by Dr. Deevey from the upper pool in Fern Canyon, Davis Mountains, Tex., on June 19, 1940. Two females were also taken in Limpia Creek 5 miles below Fort Davis, Tex., on the same date, and 10 females were found in Musquiz Creek in the Davis Mountains, Tex., on June 20, 1940. Several specimens, all males, were sent to Miss Patterson by a collector from an unknown location in Texas. Female holotype, U. S. Nat. Mus. No. 96052; male paratype, U. S. Nat. Mus. No. 96053.

Genus **Chlamydotheca** Saussure 1858

Large forms with flangelike projections at the extremities of valves. Natatory setae of second antenna fairly well developed. Third maxillary process with one toothed and two smooth spines. Second segment of third thoracic leg with two prominent setae on inner distal border. Furca well developed; dorsal margin denticulated.

Chlamydotheca texasiensis (Baird, 1862)

Fig. 22

Cypris texasiensis W. Baird, Ann. Mag. Nat. Hist. (3) 10: 4. 1862.

Chlamydotheca texasiensis N. C. Furtos, Carnegie Inst. Washington Publ. 457: 99. 1936.

Specific characters.—Female: Seen from the side, dorsal margin boldly arched; a prominent flange present at anterior end. Ventral margin nearly straight except for a blunt incisure marking off the anterior flange. Seen from above, very tumid, with greatest width amounting to about eight-fifteenths the length. Right valve projects slightly beyond left at anterior end. Posterior end narrowly rounded, anterior end rather sharply pointed. Surface of valves smooth with scattered puncta bearing delicate hairs. Two very prominent hairs on posterior extremity. Color light, with six radially arranged bands originating from a circular band around the muscle scars. Natatory setae of second antenna do not reach to tips of terminal claws. Furca very slightly curved and nineteen times as long as narrowest width of ramus; dorsal margin faintly pectinate. Length 3.30 mm, height 2.10 mm.

Male: Unknown.

Remarks.—Although somewhat similar to *C. speciosa* and *C. arcuata*, the present species may be distinguished from these forms by the much more elongated shape of *C. speciosa* and by the fact that *C. arcuata* is distinctly pointed at both extremities when viewed from above.

Occurrence.—Two females were collected from Phantom Lake in the Davis Mountains, Tex., on June 23, 1940, by Dr. Deevey.

Distribution: Texas, Ohio, Yucatán, and Louisiana.

Genus **Cypridopsis** Brady, 1867

Small, tumid forms, very high when viewed from the side; left valve usually larger than the right. Natatory setae of second antenna extend considerably beyond tips of terminal claws. Maxillary palps are not broadened distally. Furca rudimentary with a short base and flagellum.

Cypridopsis vidua (O. F. Müller, 1776)

Cypris vidua O. F. Müller, Zool. Dan. Prodr.: 199. 1776.
Cypridopsis vidua G. S. Brady, Intell. Observ. 12: 117. 1867.
Pionocypris vidua G. O. Sars, Crust. Norway, IX: Ostracoda: 135. 1928.
Cypridopsis vidua obesa N. C. Furtos, Ohio Biol. Surv. 5 (6): 430. 1933.
Cypridopsis vidua C. C. Hoff, Illinois Biol. Monogr. **19** (1–2): 151. 1942.

Specific characters.—Female: Seen from the side, short, plump forms with height equal to two-thirds the length and with broadly rounded extremities. Boldly arched dorsal margin; a distinct angle is formed slightly behind the middle. Seen from above, very broad and rounded; width about two-thirds the length. Surface of valves pitted and hairy. Color light green with three more or less prominent dark green or brown bands extending laterally from a single dorsal band. In some variations these bands are very indistinct or entirely lacking. Natatory setae of second antenna extend slightly beyond tips of terminal claws. Flagellum of furca two and one-half times longer than the length of the base; dorsal seta present. Length 0.60–0.75 mm.

Male: Unknown.

Remarks.—This is the most common and most widely distributed freshwater ostracod and has been reported from nearly all regions of North America from which collections of Ostracoda have been made. It is the common form which develops in aquaria. The wide variation in color patterns or their absence has caused the formation of new species which are undoubtedly simply color varieties of *Cypridopsis vidua*.

Occurrence.—This species was found in seven localities in Texas and one in Mexico as follows: 7 females from Fort Stockton Lake, Pecos County Tex., June 2, 1941; 12 females from Bell Canyon, Tex. (no date); 1 female from Salt Flat ditch, Hudspeth County, Tex., June 12, 1940; 12 females from tank, Salt Basin, Hudspeth County, Tex., June 10, 1940; 4 females from Balmorhea Lake, Reeves County, Tex., June 20, 1940; 9 females from Balmorhea irrigation ditch, Reeves County, Tex., June 20, 1940; and 9 females from Presa de Hipolito, Mexico.

Distribution.—Widely distributed in North America, Europe, Siberia, China, South America, Azores.

Cypridopsis phantomensis, n. sp.

Figs. 35–38

Specific characters.—Male: Seen from the side, dorsal margin boldly arched; height two-thirds the length and highest in the middle. Ventral margin sinuated in the middle. Both extremities rounded, anterior extremity more broadly rounded than posterior. Valves covered with long hairs. Testes and spermatic tubes plainly visible through valves. Natatory setae of second antenna reach slightly beyond tips of terminal claws. Second thoracic leg with penultimate

segment distinctly divided; ultimate segment about as broad as long; terminal claw toothed along its distal third. Third thoracic leg with a short curved claw and reflexed seta. Ejaculatory duct with 15 whorls of spines. Length 0.68 mm, height 0.44 mm.

Female: Unknown.

Occurrence.—Eight males were collected from Phantom Lake in the Davis Mountains, Tex., on June 23, 1940, by Dr. Deevey. Male holotype, U. S. Nat. Mus. No. 96054.

Cypridopsis musquizensis, n. sp.

Figs. 39–41

Specific characters.—Female: Seen from the side, dorsal margin rounded; height about two-thirds the length; highest in the middle; a slight indentation or concavity in the anterior third; posterior third of dorsal margin rounds evenly into the broadly rounded posterior extremity. Ventral margin slightly sinuated in the middle. Anterior extremity considerably less broadly rounded than posterior. Surface of valves sparsely hairy; hairs short and coarse. Natatory setae of second antenna reach beyond tips of terminal claws. Second thoracic leg with penultimate segment distinctly divided; terminal claw long, slender, and smooth. Length 0.70 mm, height 0.44 mm.

Male: Similar in shape to female. Appendages similar. Male is somewhat smaller than female. Ejaculatory duct with 16 whorls of spines. Length 0.62 mm, height 0.41 mm.

Occurrence.—Seven females were taken from Phantom Lake in the Davis Mountains on June 23, 1940, by Dr. Deevey. Eight specimens, both male and female, were collected by Dr. Deevey from Toya Lake, Pecos County, Tex., on June 23, 1940, and from Musquiz Creek in the Davis Mountains, Tex., on June 19, 1940. Female holotype, U. S. Nat. Mus. No. 96055; male paratype, U. S. Nat. Mus. No. 96056.

Cypridopsis toyensis, n. sp.

Figs. 42–44

Specific characters.—Female: Seen from the side, elongated, height about three-fifths the length; highest slightly anterior to the middle. Dorsal margin rounded in anterior extremity and sloping from the middle posteriorly. Ventral margin almost straight. Anterior extremity more broadly rounded than posterior. Eye prominent. Surface of valves sparsely hairy. Color reddish brown. Natatory setae of second antenna do not quite reach tips of terminal claws. Second thoracic leg with penultimate segment distinctly divided; ultimate segment broader than long; terminal claw heavily built and smooth; heavy bristles along inner border of last three segments with enlarged terminal portions, similar to the sense club of the second antenna. Length 0.61 mm, height 0.34 mm.

Male: Unknown.

Occurrence: Three females were taken at Phantom Lake, in the Davis Mountains, Tex., on June 23, 1940, by Dr. Deevey. One female was also collected from Toya Lake, Pecos County, Tex., on June 23, 1940, by Dr. Deevey. Female holotype, U. S. Nat. Mus. No. 96057.

Cypridopsis potamis, n. sp.

Figs. 45–47

Specific characters.—Female: Seen from the side, of a shape similar to that of *C. vidua.* Dorsal margin boldly arched, highest in the middle, height about two-thirds length. Ventral margin sinuated in the middle. Posterior extremity somewhat more broadly rounded than the anterior. Eye prominent. Valves with short, curved hairs. Natatory setae of second antenna reach considerably beyond tips of terminal claws. Second thoracic leg with penultimate segment distinctly divided; ultimate segment broader than long; terminal claw heavily developed and comparatively short. Third thoracic leg with large, curved, terminal claw and well-developed reflexed seta; bristles on margin of penultimate segment strongly developed. Length 0.60 mm, height 0.40 mm.

Male: Unknown.

Occurrence: One female was found in a collection made by Dr. Deevey in the San Jacinto River bottom near Harris City, Tex., on May 22, 1940. Female holotype, U. S. Nat. Mus. No. 96058.

Genus **Potamocypris** Brady, 1870

Shells very hairy, laterally compressed; right valve usually higher than left. Natatory setae generally extend to tips of terminal claws or beyond. Maxillary palp broadened distally. Furca rudimentary, with short base and flagellum.

Potamocypris smaragdina (Vavra, 1891)

Fig. 21

Cypridopsis smaragdina W. Vavra, Arch. Landesdf. Bohmen. **8** (3): 80. 1891.

Potamocypris smaragdina E. v. Daday, Ostr. Hungar.: 193. 1900.
Potamocypris smaragdina R. W. Sharpe, Ostracoda in Ward and Whipple: 808. 1918.
Potamocypris smaragdina C. C. Hoff, Illinois Biol. Monogr. 19 (1–2): 154. 1942.

Specific characters.—Female: Seen from the side, of triangular appearance, with well rounded dorsal margin; highest point anterior to the middle. Anterior end broadly rounded; posterior end more narrowly produced. Ventral margin slightly sinuated. Right valve larger than left and extending above it dorsally. Hyaline flange on left valve extends beyond right valve anteriorly and posteriorly. Seen from above, posterior end is more bluntly pointed than the anterior; greatest width less than half the length. Surface of valves pitted and very hairy, the hairs being stout and spine-like. Color light green or light yellowish-green. Natatory setae of second antenna extend beyond tips of terminal claws by one-third their own length. Furcal ramus with narrow base tapering into the flagellum; flagellum three times longer than the base; dorsal seta present. Length 0.62–0.68 mm, height 0.36–0.39 mm, width 0.32 mm.

Male: Shell of male more elongate, less high in proportion; ventral margin conspicuously sinuated. Size of males smaller but otherwise similar to females. Testes form prominent whorl in anterior part of the shell.

Remarks.—This species is very variable in size, shape, and color. It is commonly found in permanent waters such as lakes and streams and does not usually appear until May when temporary waters have normally dried up.

Occurrence.—Two females were collected from a Salt Flat ditch in Hudspeth County, Tex., on June 12, 1940, and three females from a tank, Salt Basin, Hudspeth County, Tex., on June 10, 1940.

Distribution.—In North America this species has been reported from Ohio, Illinois, Missouri, Tennessee, Washington, Louisiana, and Mexico. It is known in Europe in Bohemia and Switzerland.

Family Cytheridae: Subfamily Limnocytherinae

Genus **Limnocythere** Brady, 1867

Shells delicately built, thin and composed of horny material; surface of valves smooth or reticulated, either with or without furrows, spines or tubercles. Exopodite of second antenna often biarticulate. Thoracic legs slender and similar. Furca with single terminal claw. A few species are found in brackish waters as well as in fresh.

Limnocythere sancti-patrici Brady and Robertson 1869

Fig. 48

Limnicythere sancti-patrici G. S. Brady and D. Robertson, Ann. Mag. Nat. Hist. (4) **3**: 369. 1869.
Limnocythere sancti-patrici G. W. Müller, Das Tierreich, **31**: 332. 1912.

Specific characters.—Female: Seen from the side, oblong in shape with only a slightly greater height in front than posteriorly; height about half the length. Dorsal margin slightly concave; ventral margin deeply sinuated. Seen from above, broadly ovate in outline with a slight constriction in the middle. Anterior to the constriction is an obtuse prominence; greatest width slightly less than the height. Valves, thin and pellucid with smooth edges but faintly reticulated in other regions. Scattered hairs at both ends. Color light yellowish brown. Anterior antennae with three setae at the tip, the innermost being bifurcate. Posterior antennae with slender terminal claws. Caudal ramus directed downward; terminal bristle hardly longer than the lateral bristle. Length 0.79 mm.

Male: Somewhat larger than the female with a more elongated shell and more deeply sinuated ventral margin. Posterior end somewhat enlarged. Length 0.82 mm.

Remarks.—This rather large member of the genus Limnocythere is easily recognized by its size alone. As has been pointed out clearly by Hoff (1942), the correct spelling of the genus is with an "o" rather than with an "i", and this decision has been followed in the present report.

Occurrence.—One female and one male were found in collections made from a pool near Saratoga, Polk County, Tex., on May 11, 1940.

Distribution.—In North America this species has been reported only from lakes in Michigan, heretofore. It has been found in Norway, Sweden, the British Isles, Bohemia, Hungary, and Switzerland.

LITERATURE CITED

BAIRD, WILLIAM. *Description of some new species of entomostracous Crustacea.* Ann. Mag. Nat. Hist. (3) **10**: 1–6. 1862.

RIOJA, ENRIQUE. *Prospecto biológico del Lago de Patzcuaro.* Anal. Inst. Biol. México. **11**: 469–475. 1940a.

———. *Morfología de un ostracode epizoario observado sobre* Cambarus (Cambarellus) montezumae *Sauss. de México,* Entocythere heterodonta *n. sp. y description de algunos de sus estados larvarios.* Anal. Inst. Biol. México **11**: 593–609. 1940b.

———. *Descripción de una especie y una subspecie nuevas del genero* Entocythere *Marshall, procedentes de la Cueva Chica (San Luis Potosí, México).* Ciencia **3**: 201–204. 1942.

———. *Nuevos datos de los* Entocythere *(Crus. Ostracodos) de México.* Anal. Inst. Biol. México **15**: 1–22. 1944.

SAUSSURE, H. DE. Memoires sur div. Crustac. nouv. des Antilles et du Mexique. Mem. Soc. Geneve. 14: II, 486–490. 1858.

TRESSLER, WILLIS L. *The Ostracoda.* In Ward and Whipple's "Freshwater Biology" (second edition). In press.

ENTOMOLOGY.—*The ant larvae of the myrmicine tribes Cataulacini and Cephalotini.* GEORGE C. WHEELER and JEANETTE WHEELER, University of North Dakota. (Communicated by C. F. W. Muesebeck.)

The tribe Cataulacini consists of a single genus (*Cataulacus*), which comprises about 45 species and occurs in the Ethiopian, Malagasy, Indomalayan, and Papuan Regions, with the greatest number of species in the Ethiopian. "All the species of this genus are tree-ants, usually forming medium-sized nests in hollow twigs and stems, or more rarely under the bark. They are timid and slow-moving insects, often feigning death or dropping rapidly to the ground when disturbed." (Arnold *fide* Wheeler, 1922, p. 198.)

The Neotropical tribe Cephalotini comprises about 90 species in four genera: *Procryptocerus, Zacryptocerus, Cephalotes,* and *Paracryptocerus.* The last-named is the largest with 60 species, three of which range into the southern Nearctic in Arizona, Texas, and Florida.

The ants of these two tribes are particularly interesting because of convergence. Although they inhabit different hemispheres, they occupy similar niches, i.e., they are ecological equivalents. Both are arboreal and live in cavities in plants. "Similarity in habits has gradually resulted in a remarkable resemblance in the shape of the head and the flattened body, . . . though they are not closely related to each other" (Wheeler, 1922, p. 496).

The larvae are likewise convergent in body shape and in pilosity. The body is elongate, straight (or nearly so), and subcylindrical or subellipsoidal; hairs are mostly minute or short. Both of these characters are possibly adaptations to life in plant cavities, particularly tubular cavities of small bore. A long larva parked parallel and close to the wall would be less of a traffic hazard than a shorter larva parked crosswise or obliquely. These same characters are to be found also in the larvae of other ants which inhabit plant cavities, notably *Azteca, Camponotus, Crematogaster, Leptothorax,* and the Pseudomyrmecinae. *Camponotus* larvae have a neck, but it is short, stout, and strongly curled ventrally so that the cylindricality of the profile as a whole is scarcely affected. *Leptothorax* is somewhat stouter than the others; perhaps it is only in the early stages of adaptation.

The only noteworthy larval difference between these two tribes is to be found in the dorsal uncinate hairs: those of the Cataulacini have a single stout hook at the tip; in the Cephalotini they are anchor-tipped, i.e., with two stout hooks.

One-hooked dorsal hairs occur in *Azteca* and the Pseudomyrmecinae as well as in the Cataulacini. Anchor-tipped dorsal hairs occur in *Crematogaster* and *Leptothorax* as well as in the Cephalotini, but they are also to be found in many myrmicine genera which do not inhabit plant cavities.

Tribe CATAULACINI Emery

Elongate and subellipsoidal; nearly straight; prothorax forming a very short stout neck, which is inclined ventrally to about 45°. Spiracles minute, decreasing slightly in diameter toward the posterior end. Body hairs mostly very short; single-hooked (i.e., not anchor-tipped) hairs on the dorsum. Head moderately large; clypeus bulging. Antennae minute. Head hairs minute to very short. Anterior surface of labrum with

16 minute hairs not arranged in a transverse row or band; posterior surface with about six sensilla, but apparently without spinules. Mandibles roughly trapezium-shaped in anterior view; surfaces smooth; apex forming a slender acute tooth which is curved medially; subapical portion of medial border highly variable, more or less projecting and bearing 2–5 denticles. Maxillae apparently without spinules; cardo swollen ventrolaterally, its surface roughened with bosses and minute hairs; stipes distinct, smaller, paraboloidal and smoother; palp and galea minute. Labium and hypopharynx apparently without spinules; palps minute; opening of sericteries a short transverse slit.

Genus **Cataulacus** F. Smith

Plump and nearly straight; elongate-subellipsoidal; prothorax forming a very short stout neck which is inclined ventrally to about 45°. Body hairs numerous and mostly very short, with the tip bifid or denticulate; single-hooked (i.e., not anchor-tipped) hairs on the dorsum. Head moderately large. Cranium transversely subrectangular in anterior view. Clypeus bulging. Antennae minute. Head hairs numerous; minute to very short; with the tip simple or bifid or denticulate. Labrum very thick at the base; the ventral border feebly scalloped; anterior surface with 16 minute hairs. Mandibles roughly trapezium-shaped in anterior view; the apex forming a short slender acute tooth which is curved medially, subapical portion of inner border highly variable, more or less projecting and bearing 2–5 denticles. Maxillae with the cardo swollen ventrolaterally, its surface roughened with bosses and minute hairs; stipes distinct, smaller, paraboloidal and smoother; palp minute, represented by a cluster of five sensilla; galea minute, represented by two contiguous sensilla. Labial palps minute; each represented by a cluster of five sensilla.

Cataulacus taprobanae F. Smith

Figs. 1–8

MATURE LARVA: Length about 3.7 mm. Plump and elongate-subellipsoidal; diameter greatest at the third abdominal somite; prothorax forming a very short stout neck which is inclined ventrally to about 45°; a pair of ventrolateral bosses on the prothorax. Anus posteroventral. Leg and wing vestiges present. Segmentation indistinct. Spiracles minute, decreasing slightly in diameter toward the posterior end. Integument apparently without spinules. Body hairs numerous and uniformly distributed except at the posterior end. Of three types: (1) on all surfaces of all somites, minute to very short (0.009–0.036 mm), with bifid tip (the branches may be denticulate); (2) on the dorsal surface of all somites except the tenth abdominal, a few longer (0.045–0.063 mm), with the tip denticulate; (3) moderately long (about 0.27 mm), with tortuous shaft and a single apical hook, four in a row across the dorsum of each abdominal somite I–VI. Head moderately large; cranium transversely subrectangular in anterior view (breadth 1.6 times length); clypeus bulging. Antennae minute, each with three sensilla, each of which bears a spinule (one of the spinules very long). Head hairs numerous, minute to very short (0.009–0.036 mm), with the tip simple or bifid or denticulate. Labrum very thick at the base; breadth 1.8 times length; ventral border feebly scalloped; anterior surface with about 16 minute hairs about 0.025 mm long; on and near the ventral border are about ten sensilla; posterior surface with about six sensilla but without spinules. Mandibles moderately sclerotized; roughly trapezium-shaped in anterior view, the apex forming a slender acute tooth which is curved medially; subapical portion of inner border highly variable, more or less projecting and bearing 2–5 denticles. Maxillae with the cardo swollen ventrolaterally, its surface roughened with bosses and minute hairs; stipes distinct, smaller, paraboloidal, and smoother; palp minute, represented by a cluster of five sensilla (three bearing a spinule each); galea minute, represented by two contiguous sensilla. Labial palps minute, each represented by a cluster of five sensilla (three bearing a spinule each); an isolated sensillum medial to each palp; opening of sericteries a short transverse slit.

YOUNG LARVA: Length about 1.3 mm. Diameter nearly uniform; greatest at abdominal somites III and IV. Integument of dorsal surface of posterior somites with a few minute spinules which are isolated or in pairs. Body hairs of three types: (1) simple, minute (0.007–0.018 mm), without alveolus and articular membrane, most numerous on the anteroventral surface, decreasing posteriorly and dorsally; (2) with the tip simple or bifid-simple or bifid-denticulate, minute to short (0.003–0.07 mm), with alveolus and articular membrane, a few on each somite; (3) one-hooked hairs with tortuous shaft, long

(about 0.21 mm), four in a row across the dorsum of each abdominal somite I-V. Otherwise generally similar to the mature larva.

Material studied: 20 larvae from the Philippine Islands.

Cataulacus egenus Santschi

Apparently similar to *taprobanae* except in the following details: Body hairs longer. Antennae with two sensilla each. Breadth of labrum 2.5 times the length. (Material studied: six damaged integuments from the Congo.)

Wheeler and Bailey, 1920: "he larval stomach is voluminous and closely packed with coarse chitinous fragments of small insects . . . interspersed with numerous fungus spores" (p. 255). Plate 1, figure 6, portion of stomach contents showing spores. "The mandibles of the larvae . . . are short, broad and stout and therefore well-adapted to crushing, so that the coarse fragments may have been bitten off by the larvae from larger pieces or whole insects proffered by their worker nurses. The pieces may, however, have been cut up to a considerable extent by the workers" (p. 255).

Cataulacus horridus F. Smith

Similar to *taprobanae* except in the following details: Body hairs of three types: (1) on the ventral and lateral surfaces, minute to very short (0.009–0.027 mm), 2- to 4-branched; (2) on the dorsal surface, 0.036–0.126 mm, the longest hairs with short-bifid tip grading into multifid shorter hairs; (3) moderately long (about 0.3 mm), with tortuous shaft and a single apical hook, four in a row across the dorsum of each abdominal somite I-V. Antennae with two (rarely three) sensilla each. Mandibles with the apical tooth longer and more curved. (Material studied: five larvae from Borneo.)

Tribe CEPHALOTINI M. R. Smith
(= Cryptocerini Forel)

Elongate and subcylindrical; straight (or nearly so); no neck; head applied to the body near the anterior end. Spiracles minute, decreasing slightly in diameter toward the posterior end. Body hairs mostly short or minute; anchor-tipped hairs present. Head small; bulging anteriorly as a whole or in part. Head hairs minute or short. Labrum short and broad; with a row (or narrow band) of 6–16 conspicuous hairs across the anterior surface; posterior surface with 6–12 sensilla but apparently without spinules. Mandibles subtriangular in anterior view; anterior surface usually produced medially into a small blade; surfaces smooth (except a few spinules in *Cephalotes*). Maxillae without spinules (except a few in *Paracryptocerus pusillus*). Labium and hypopharynx apparently without spinules. Opening of sericteries a short transverse slit.

Genus **Procryptocerus** Emery

Body hairs numerous; mostly minute; anchor-tipped hairs present. Cranium transversely subelliptical in anterior view. Head hairs few and short. Labrum trilobed. Mandibles with the apex forming a short round-pointed tooth which is slightly curved medially; anterior surface produced medially to form a rather wide blade bearing two stout teeth on its inner border. Maxillae with the apex conoidal and directed medially; palp represented by a slightly raised cluster of five sensilla; galea a short slender peg. Labium small; palps represented each by a cluster of five sensilla.

Procryptocerus pictipes Emery

Figs. 9–13

Leg vestiges present. Spiracles minute, decreasing slightly in diameter toward the posterior end. Integument with a few short rows of minute spinules on the ventral surface of the prothorax. Body hairs moderately numerous and uniformly distributed. Of three types: (1) simple, minute (0.009–0.036 mm), the most abundant type; (2) with short-bifid tip, short (0.054–0.08 mm), very few, near the anchor-tipped hairs; (3) anchor-tipped with tortuous shaft, short (about 0.11 mm), four in a row across the dorsum of each abdominal somite I-IV. Cranium transversely subelliptical (in anterior view); breadth 1.4 times length. Antennae each with three minute sensilla, each of which bears a spinule. Head hairs few, short (0.018–0.036 mm) and simple. Labrum trilobed, breadth nearly twice the length; anterior surface with about eight hairs in a narrow transverse band; on the ventral border are about six sensilla; posterior surface with eight isolated sensilla but no spinules. Mandibles short and stout, subtriangular in anterior view; apex forming a short round-pointed tooth which is slightly curved medially; anterior surface produced medially to form a rather wide blade bearing two stout teeth on its inner border. Maxillae with the apex conoidal and directed medially; palp a slightly

raised cluster of five sensilla each of which bears a spinule; galea represented by two sensilla on the end of a short slender peg. Labium small, each palp represented by a cluster of five sensilla; an isolated sensillum between each palp and the opening of the sericteries; the latter a short transverse slit. (Material studied: four damaged integuments from British Guiana.)

Procryptocerus schmalzi Emery

Figs. 14–17

Generally similar to *pictipes* but differing as follows: Body hairs of two types: (1) minute (0.009–0.036 mm), bifid or multifid tip, generally distributed, stouter on the ventral surface; (2) anchor-tipped with tortuous shaft, moderately long (about 0.15 mm), four in a row across the dorsum of each abdominal somite I-V. Antennae each with two sensilla. Head hairs numerous, with denticulate tip. Labrum feebly bilobed; anterior surface of each half with five or six bifid-tipped hairs and an isolated sensillum; ventral border with a cluster of three or four sensilla on each half. (Material studied: a single damaged integument from Costa Rica.)

Genus Zacryptocerus Wheeler

Body hairs numerous; anchor-tipped hairs present. Cranium subpentagonal in anterior view; scarcely broader than long. Antennae small. Head hairs moderately numerous. Labrum short and very broad; ventral border nearly straight. Mandibles curved medially; apex acute; no medial teeth. Maxillae with a lateral boss on the cardo; stipes paraboloidal; palp minute, represented by a cluster of five sensilla; galea minute, a short slender peg. Labial palps minute, each represented by a cluster of five sensilla.

Zacryptocerus clypeatus (Fabricius)

Figs. 29, 30

Leg and gonopod vestiges present. Body hairs numerous; anchor-tipped hairs present. Cranium subpentagonal in anterior view, slightly broader than long. Head hairs moderately numerous. Antennae small, each with three sensilla, each of which bears a spinule. Labrum short and broad (breath 2.5 times length), ventral border nearly straight; anterior surface with about 15 minute hairs in a narrow transverse band; 11 sensilla on or near the ventral border; posterior surface with a cluster of about a dozen sensilla. Mandibles moderately sclerotized; subtriangular in anterior view, curved medially; apex acute; anterior surface produced medially into a small blade. Cardo of each maxilla with a small but distinct lateral boss; the stipes paraboloidal; palp minute, represented by an elevated cluster of five sensilla; galea minute, a short peg bearing two apical sensilla. Labium with each palp minute and represented by a cluster of five sensilla; an isolated sensillum between each palp and the opening of the sericteries; the latter a short transverse slit. (Material studied: a single damaged integument from Brazil.)

FIGS. 1–8.—*Cataulacus taprobanae* F. Smith: 1, Head in anterior view, ×57; 2, right antenna in anterior view, ×429; 3, left mandible in anterior view, ×167; 4, young larva in side view, ×20; 5, body hair with denticulate tip, ×235; 6, single-hooked dorsal body hair, showing two variations of the hook, ×235; 7, body hair with bifid tip, ×235; 8, mature larva in side view, ×20.

FIGS. 9–13.—*Procryptocerus pictipes* Emery: 9–11, Three types of body hairs, ×185; 12, head in anterior view, ×76; 13, left mandible in anterior view, shaded to show thickness, ×185.

FIGS. 14–17.—*Procryptocerus schmalzi* Emery: 14, Body hair with bifid tip, ×185; 15, stout body hair with multifid tip, ×185; 16, anchor-tipped body hair, ×185; 17, left mandible in anterior view shaded to show thickness, ×185.

FIGS. 18–28.—*Cephalotes atratus* (Linnaeus): 18, Mature worker larva in ventral view, ×5; 19, mature worker larva in side view, ×5; 20, very young larva in side view, ×5; 21, anchor-tipped body hair, showing tip in surface view and in edge view, ×95; 22, [missing from engraving]; 23, two stout body hairs, ×95; 24, slender body hair, ×95; 25, head in anterior view, ×31; 26, left mandible in anterior view, ×95; 27, left mandible in medial view, ×95; 28, left mandible in lateral view, ×95.

FIGS. 29, 30.—*Zacryptocerus clypeatus* (Fabricius): 29, Head in anterior view, ×40; 30, left mandible in anterior view, shaded to show thickness, ×95.

FIGS. 31–38.—*Paracryptocerus minutus* (Fabricius): 31, Head in anterior view, ×52; 32, head in side view, ×52; 33 and 34, two types of body hairs, ×185; 35, left mandible in anterior view, ×185; 36, first (?) instar larva in side view, ×10; 37, mature larva in ventral view, ×10; 38, mature larva in side view, ×10.

FIGS. 39–40.—*Paracryptocerus* (*Harnedia*) *wheeleri* (Forel): 39, Right maxillary palp in lateral view, ×370; 40, left mandible in anterior view, shaded to show thickness, ×185.

FIG. 41.—*Paracryptocerus pusillus* (Klug): 41, Head in side view, ×44.

FIGS. 42–44.—*Paracryptocerus* (*Harnedia*) *umbraculatus* (Fabricius): 42–44, Three types of body hairs, ×185.

FIGS. 45–46.—*Paracryptocerus multispinus* (Emery): 45, Head in anterior view, ×44; 46, left maxilla in anterior view, ×185.

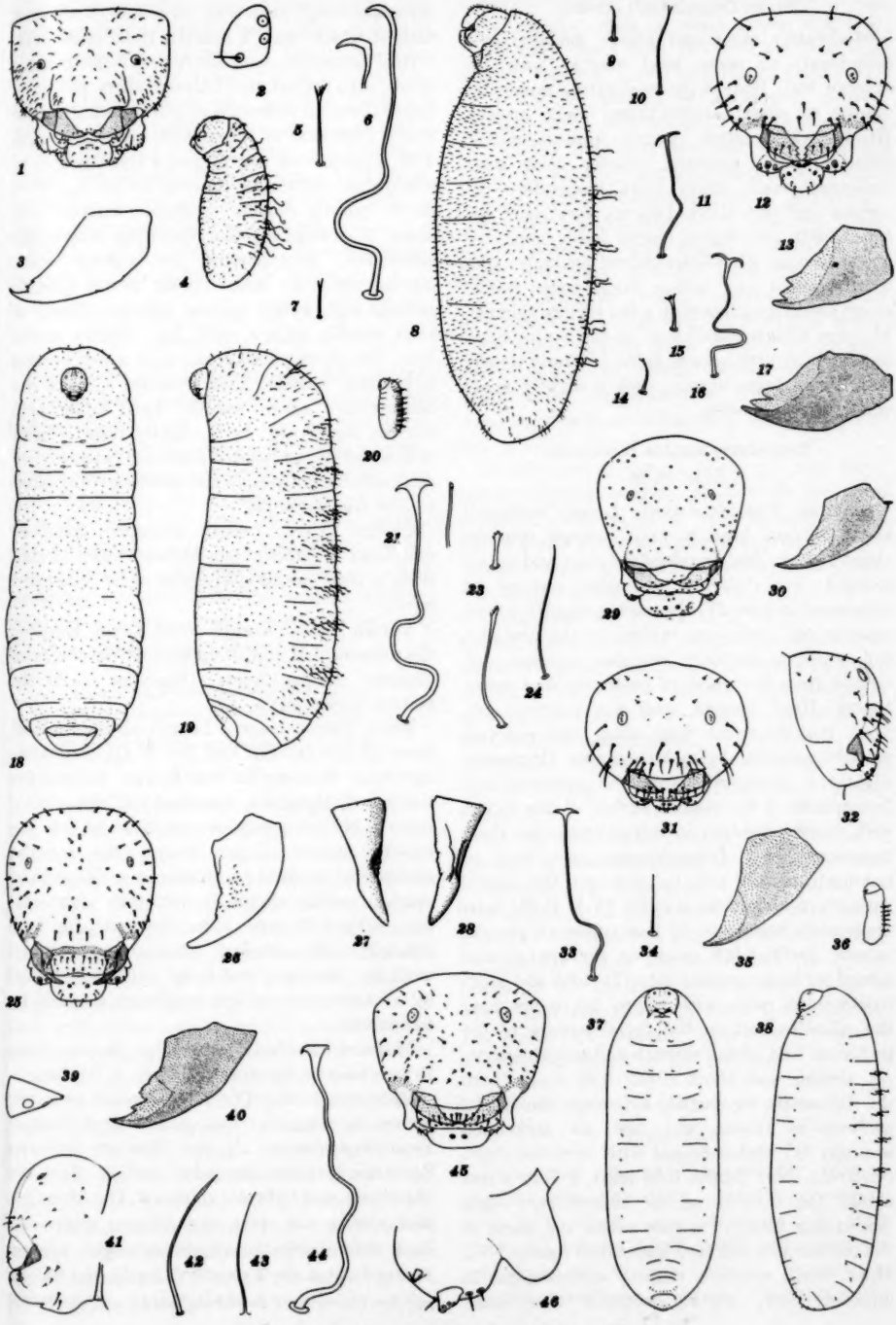


FIG. 1–46.—(See opposite page for legend).

Genus **Cephalotes** Latreille

Moderately stout and nearly straight; subcylindrical; no neck; head ventral, near the anterior end. Body hairs moderately numerous, minute to short; anchor-tipped hairs present. Head small. Cranium vaguely subhexagonal in anterior view; scarcely broader than long. Antennae small. Head hairs moderately numerous and very short. Labrum very short and broad, with the ventral border feebly impressed at the middle. Mandibles curved medially; apex round-pointed and rather stout; inner border erose; anterior surface with a few minute spinules. Maxillae with a lateral boss on the cardo; stipes paraboloidal; palp a peg; galea a minute slender peg. Labial palps minute, each a slightly raised cluster of five sensilla.

Cephalotes atratus (Linnaeus)

Figs. 18–28

Mature Worker Larva: Length (straight) about 11 mm; head to anus through spiracles about 13 mm. Body moderately stout and nearly straight; subcylindrical; diameter greatest at abdominal somite IV, decreasing slightly to the anterior end and more rapidly to the posterior end which is narrowly rounded; anterior end formed from the dorsa of prothorax and mesothorax. Head ventral, near the anterior end. Anus posteroventral. Leg, wing, and gonopod vestiges present. Spiracles minute, decreasing slightly in diameter toward the posterior end. Integument of the ventral surface of the thorax with minute spinules in rather numerous short transverse rows. Integumentary structures of unknown nature and function on the lateral surfaces of abdominal somites IV-I. Body hairs moderately numerous. Of four types: (1) simple, minute (0.006–0.018 mm), on the ventral and lateral surfaces; grading into (2) stout and short (0.018–0.198 mm), with frayed tip, a few near the spiracles and on the dorsal surface of the prothorax and of the seventh abdominal somite; (3) slender and short (0.027–0.28 mm), with the tip simple or frayed, a few on the dorsal surfaces of thorax and first six abdominal somites; (4) anchor-tipped with tortuous shaft, relatively short (about 0.45 mm), 4–8 in a row across the dorsum of the mesothorax, eight (sometimes nine) in a row across the dorsa of the metathorax and each abdominal somite I-VI. Head small; cranium vaguely subhexagonal in anterior view, slightly broader than long. Antennae small, each with three minute sensilla, each of which bears a spinule. Head hairs moderately numerous, very short (0.018–0.046 mm), stout, with frayed tip. Labrum short and very broad (breadth twice the length), ventral border feebly impressed at the middle; anterior surface with a transverse row of 11–14 short simple or bifid-tipped hairs and (ventral to the hairs) 10 or 11 minute sensilla; posterior surface with about 10 isolated sensilla. Mandibles moderately sclerotized; subtriangular in anterior view, curved medially; inner border erose; anterior surface with a few minute spinules. Cardo of each maxilla with a small but distinct lateral boss; the stipes paraboloidal palp a peg bearing five apical sensilla; galea minute, a short peg bearing two apical sensilla. Each labial palp minute, represented by a slightly raised cluster of five sensilla; an isolated sensillum between each palp and the opening of the sericteries; the latter a short transverse slit.

Queen Larva: Length (straight) about 13 mm; head to anus through spiracles about 14 mm. Body a trifle stouter. Otherwise as in the worker larva.

Young Larva: Length about 3 mm. Head on the anterior end and of approximately the same diameter as the thorax. Otherwise as in the mature worker larva.

Very Young Larva: Length about 1.5 mm. Head on the anterior end and of approximately the same diameter as the thorax. Body hairs shorter. Integument spinulose on the dorsal surface of the posterior somites and on the ventral surface of the thorax, the spinules minute and in short transverse rows. Head hairs slender, mostly simple (a few with short-bifid tip), 0.009–0.09 mm. Mandibles with the base inflated; apex slender, conoidal and curved medially. Maxillary and labial palps represented by a loose cluster of five sensilla each, galea by two sensilla.

Material studied: numerous larvae from British Guiana, courtesy of Dr. N. A. Weber.

Eidmann, 1936: "Die Larve besitzt eine sehr grosse Kopfkapsel, die durch dunkelbraune Verstärkungsleisten an den Rändern und der Basis der Mandibel besonders auffällt. Auch die Mundteile sind teilweise gebräunt. Die Mandibel sind kräftig und spitz und können hinter der stark entwickelten Oberlippe verborgen werden. Ferner besitzt die Larve 8 Oncochaeten-Reihen auf der Dorsalseite des Metathorax und des 1.—7.

Abdominalsegmentes. Die Oncochaeten sind stark gekrümmt, kräftig und laufen in ankerförmig gegabelte Spitzen aus. Durch ihre dunkelbraune Färbung heben sie sich von dem weissen Larvenkörper sehr gut ab. Auch am toten Material bewirken sie noch ein festes Aneinanderhaften der Larven zu grösseren Ballen" (pp. 82–83). Plate I, figure VIII: head in anterior view; a row of anchor-tipped hairs; a single anchor-tipped hair greatly enlarged.

Wheeler, G. C., 1938, p. 141: wing rudiments occur in both worker and male larvae.

Genus **Paracryptocerus** Emery
(= *Cryptocerus* of authors)

Plump, straight, and elongate-subellipsoidal; no neck; head applied to the anteroventral surface. Body hairs very few to numerous; minute to short; anchor-tipped hairs present. Head small; bulging anteriorly, as a whole or in part. Head hairs few to numerous; minute to short. Labrum very short and broad, ventral border slightly convex. Mandibles curved medially; apex acute; a short narrow blade projecting medially from the anterior surface; inner border without teeth (but with denticles in some species). Galea minute or small.

Subgenus **Paracryptocerus** Emery
[= *Cryptocerus* (*Paracryptocerus*)]

Paracryptocerus minutus (Fabricius)

Figs. 31–38

MATURE WORKER LARVA: Length about 4.8 mm. Plump, straight and elongate-subellipsoidal; diameter greatest at abdominal somites III and IV, decreasing gradually toward either end; no neck; head applied to the anteroventral surface. Anus posteroventral. Leg vestiges conspicuous, wing vestiges present. Segmentation indistinct. Spiracles minute, diameter decreasing slightly toward the posterior end. Integument of entire body with rather long transverse rows of minute spinules. Integumentary structures of unknown nature and function on the lateral surfaces of abdominal somites I-VI. Body nearly naked. Body hairs of two types: (1) simple, minute to short (0.009–0.054 mm), longest and most numerous on the prothorax and around the anus; (2) anchor-tipped with tortuous shaft, short (about 0.18 mm), four in a row across the dorsum of the metathorax and of each abdominal somite I-V. Head small; frons bulging; cranium transversely subelliptical in anterior view (breadth 1.4 times length). Antennae each with three sensilla, each of which bears a spinule. Head hairs few, short (0.009–0.036 mm) and simple. Labrum short and broad (breath 2.8 times length); ventral border slightly convex; anterior surface with about 11 conspicuous hairs in a narrow transverse band and (ventral to the hairs) 10 sensilla; posterior surface with eight isolated sensilla. Mandibles small; moderately sclerotized; subtriangular in anterior view, curved medially; apex acute; a short narrow blade projecting medially from the anterior surface. Maxillae small, paraboloidal; palp represented by a cluster of two large and two or three small sensilla; galea minute, represented by two contiguous sensilla. Labium small; palps minute, each represented by a cluster of five sensilla; opening of sericteries a short transverse slit.

YOUNG LARVA: Length about 1.9 mm. Body nearly straight; slightly swollen at the third abdominal somite. Head on the anterior end and of nearly the same diameter as the prothorax. Integumentary spinules more conspicuous. Otherwise similar to the mature larva.

FIRST (?) INSTAR LARVA: Length about 0.8 mm. Subcylindrical; head on the anterior end and of nearly the same diameter as the thorax. Spiracles minute. Body hairs shorter. Integumentary spinules restricted to the ventral surface of the thorax. Head nearly naked.

Material studied: numerous larvae from British Guiana, Guatemala, and the Panama Canal Zone.

Wheeler and Bailey, 1920, p. 255: "The larval stomach is voluminous and closely packed with coarse chitinous fragments of small insects. . . . The mandibles of the larvae . . . are short, broad and stout and therefore well-adapted to crushing, so that the coarse fragments may have been bitten off by the larvae from larger pieces or whole insects proffered by their worker nurses. The pieces may, however, have been cut up to a considerable extent by the workers."

Paracryptocerus multispinus (Emery)

Figs. 45, 46

Integument of body apparently without spinules. Spiracles small, diameter decreasing posteriorly. Body hairs numerous. Of three types: (1) minute (0.006–0.009 mm), with the tip simple or divided, without alveolus or articular membrane, generally distributed, the

most abundant type; (2) short (0.018–0.15 mm), with the tip bifid, less abundant than Type 1, generally distributed; (3) anchor-tipped with tortuous shaft, moderately long (about 0.32 mm), five or six in a row across the dorsum of the metathorax and of each abdominal somite I-VI. Cranium subtrapezoidal (in anterior view), with all corners rounded; breadth 1.3 times length; integument spinulose, the spinules minute and in numerous short transverse rows; frons and clypeus bulging. Antennae conspicuous and rather large, each with three sensilla, each of which bears a spinule. Head hairs numerous, minute to short (0.009–0.054 mm), stout with frayed tip. Labrum subrectangular, slightly narrowed dorsally, ventral corners rounded, short and broad (breadth 2.5 times length); anterior surface with about 16 hairs in a transverse band and (ventral to the hairs) 10 sensilla; posterior surface with eight isolated sensilla. Mandibles moderately sclerotized, subtriangular in anterior view and curved medially, a narrow short blade projects medially from the anterior surface. Cardo of each maxilla with a distinct lateral boss; the stipes lobose; palp small and conical, bearing five sensilla; galea minute, a short slender peg bearing two sensilla. Labial palps each represented by a slightly elevated cluster of five sensilla; opening of sericteries a short transverse slit. (Material studied: 13 damaged integuments from Guatemala.)

Wheeler and Bailey, 1920, p. 255: The quotation above under *minutus* was also applied to *multispinus*.

Paracryptocerus pusillus (Klug)

Fig. 41

Similar to *minutus*, except in the following characters: Body hairs somewhat longer. Anchor-tipped hairs two on the metathorax and four to six each on abdominal somites I-V. Head thick throughout. Antennae minute. Anterior surface of labrum with 6–9 hairs; posterior surface with 6–10 sensilla. Inner border of mandibular blade highly variable (smooth, erose or with two denticles). Maxillae with a few isolated spinules lateral to each palp. Labium with an isolated sensillum between each palp and the opening of the sericteries. (Material studied: four larvae from the Panama Canal Zone.)

Eidmann, 1936, p. 84: "Die Altlarven und Puppen stammen vermutlich aus einer vorwinterlichen Eiablage, die nachwinterliche Eiablage des Frühjahres hatte wahrscheinlich entsprechend der geringen Zahl der Eier und Junglarven erst vor kurzem eingesetzt. Damit stimmt überein, dass sich später (4. X.) in einem anderen Nest keine Altlarven, sondern nur noch Puppen sowie zahlreiche kleine und mittelgrosse Larven vorfanden. Die Larven fielen im Gegensatz zu den *Cephalotes*-Larven durch ihren kleinen Kopf und die geringe Ausstattung mit Oncochaeten auf. Von den letzteren fanden sich auf den 7 damit versehenen Segmenten nur je 4. und zwar in symmetrischer Anordnung je 2 beiderseits der dorsalen Mittellinie."

Subgenus **Cyathomyrmex** Creighton
[= *Cryptocerus* (*Cyathocephalus* = *Cyathomyrmex*)]

Paracryptocerus (**Cyathomyrmex**) **varians** (F. Smith)

Similar to *minutus* except in the following characters: Head more ventral. Body hairs somewhat more numerous, but still sparse and mostly inconspicuous. Of three types: (1) simple, minute (0.009–0.027 mm), generally distributed; (2) with the tip divided, short (0.054–0.072 mm), few, on the dorsa of the metathorax and abdominal somite VI; (3) anchor-tipped with tortuous shaft, moderately long (about 0.18 mm), four in a row across the dorsum of each abdominal somite I-V. Clypeus bulging; cranium subtrapezoidal in anterior view, but with all corners broadly rounded; narrowed ventrally; maximum breadth 1.6 times length. Labrum with about 12 sensilla on the posterior surface. Labium with an isolated sensillum medial to each palp. (Material studied: numerous larvae from Cuba and the Bahamas.)

Wheeler and Bailey, 1920, p. 255: The quotation above under *minutus* was also applied to *varians*.

Subgenus **Harnedia** M. R. Smith
[= *Cryptocerus* (*Cryptocerus*) of authors]

Paracryptocerus (**Harnedia**) **maculatus** (F. Smith)

Similar to *minutus* except in the following details: Body hairs moderately numerous. Of three types: (1) very short (about 0.018 mm), with the tip simple or bifid, without alveolus and articular membrane, generally distributed, the most numerous type; (2) minute to short (0.009–0.072 mm), with the tip simple or bifid, with alveolus and articular membrane, most numerous on the venter of the prothorax,

scattered elsewhere; (3) short (about 0.22 mm), anchor-tipped with tortuous shaft, four in a row across the dorsum of each abdominal somite I-V. Head hairs moderately numerous, the tip simple or bifid, longer (0.018–0.054 mm). Antennae small. Anterior surface of labrum with about eight hairs; posterior surface with about a dozen sensilla. Labium with an isolated sensillum between each palp and the opening of the sericteries. (Material studied: three larvae from the Panama Canal Zone.)

Paracryptocerus (Harnedia) umbraculatus (Fabricius)

Figs. 42–44

Apparently similar to *minutus* except in the following details: Body hairs moderately numerous. Of three types: (1) simple, slender, minute to short (0.009–0.108 mm), mostly without alveolus and articular membrane, generally distributed, the most abundant type; (2) stout, short-pointed, short (about 0.09 mm), six each on the dorsa of mesothorax and abdominal somite VII; (3) anchor-tipped with tortuous shaft, short (about 0.23 mm), 6–8 in a row across the dorsum of the metathorax and of each abdominal somite I-VI. Head hairs moderately numerous, with tip simple or bifid, longer (0.018–0.063 mm). Anterior surface of labrum with about 14 hairs. Maxillary and labial palps each a knob bearing five sensilla, one of which is elevated; an isolated sensillum medial to each labial palp. (Material studied: six damaged integuments from British Guiana.)

Paracryptocerus (Harnedia) wheeleri (Forel)

Figs. 39, 40

Apparently similar to *minutus* except in the following details: Body and head hairs somewhat shorter. Posterior surface of labrum with 12 sensilla. Mandibles with the apex turned medially, inner border of the blade with six denticles. Maxillary and labial palps each a subcone bearing five sensilla; an isolated sensillum between each palp and the opening of the sericteries. (Material studied: three damaged specimens from Mexico.)

Wheeler and Bailey, 1920, p. 255: The quotation above under *minutus* was also applied to *wheeleri*.

LITERATURE CITED

EIDMANN, H. *Ökologisch-faunistische Studien an südbrasilianischen Ameisen*. Arb. Phys. Angew. Ent. Berlin-Dahlem **3**: 26–48, 81–114, 1 pl., 5 text figs. 1936.

WHEELER, G. C. *Are ant larvae apodous?* Psyche **45**: 139–145, 2 pls. 1938.

WHEELER, W. M., et al. *The ants collected by the American Museum Congo Expedition*. Bull. Amer. Mus. Nat. Hist. **45**: 1–1139, 45 pls., 103 text figs., 47 maps. 1922.

WHEELER, W. M., and BAILEY, I. W. *The feeding habits of pseudomyrmine and other ants*. Trans. Amer. Phil. Soc. (art. 4): 235–279, 5 pls., 6 text figs. 1920.

PROCEEDINGS OF THE ACADEMY

56th ANNUAL MEETING

The 56th Annual Meeting and dinner of the Academy was held at Hotel 2400 on the evening of January 15, 1954.

After dinner President SETZLER called the meeting to order. The minutes of the 55th Annual Meeting, as published in the Journal **43**: 261–271, August 1953, were approved.

The following reports of officers and committee chairmen were read and approved:

REPORT OF THE SECRETARY

As of January 19, 1954, the membership of the Academy was 933, a net gain of 20 members during the year. The current membership includes 824 active members, 98 retired members, and 10 honorary members. Twelve members resigned, 13 were dropped for nonpayment of dues, and 10 were transferred to the retired list.

The deaths of 17 members were reported to the Secretary since the last Annual Meeting:

EDWARD B. VEDDER in January 1951
HERBERT E. GREGORY, January 23, 1952
L. L. HARTER, October 6, 1952
THOMAS A. JAGGAR, January 17, 1953
CHARLES MOON, January 31, 1953
DOUGLAS H. CAMPBELL, February 23, 1953
JOHN R. MOHLER, February 28, 1953
CHARLES W. BACON, March 19, 1953
GEORGE R. WAIT, April 9, 1953
GEORGE R. PUTNAM, July 2, 1953
FREDERICK E. WRIGHT, August 25, 1953
ERMINE COWLES CASE, September 7, 1953
WILLIAM H. HOOVER, September 11, 1953
WALTER F. STUTZ, December 3, 1953
T. W. STANTON, December 4, 1953
N. H. HECK, December 21, 1953
PAUL G. AGNEW, January 9, 1954.

Three societies became affiliated with the Academy during the year: The Washington Chapter of the American Society for Metals, the Washington Section of the International Association for Dental Research; and the Washington Section of the Institute of the Aeronautical Sciences. There are now 23 societies affiliated with the Academy, and the affiliation of another is pending.

Seven regular meetings of the Academy were held during the year and the Board of Managers met eight times to transact routine business of the Academy.

At the April 13 meeting of the Board of Managers, a statement prepared by a special committee of the Committee on Policy and Planning concerning the action of the Secretary of Commerce in regard to the Bureau of Standards was unanimously approved, with the recommendation that the statement be sent to appropriate persons. This was done in the form of a telegram, sent to President Eisenhower the same evening, and released to the press the following day. Copies were also sent to the President of the National Academy of Sciences, the Chairman of the Interdepartmental Committee on Scientific Research and Development, to members of the committee appointed by the National Academy to look into the objectives of the National Bureau of Standards, to the American Association for the Advancement of Science, and to the Vice-Presidents of the Washington Academy of Sciences representing the Affiliated Societies. (See Journal **44**: 61, 1954.)

Grants-in-Aid for Research totaling $350, from funds received from the American Association for the Advancement of Science, were made to Alfred Weissler, for his studies on the application of ultrasonic waves to chemical problems, and to Herbert C. Hanson, for his studies on the relationship of grassland communities to environmental conditions.

The thirty-fourth edition of the Red Book or Directory of the Academy was published in December. The plates have been saved so that the next edition, possibly in two years, could be published at a minimum cost.

The Index to the Proceedings and the first 40 volumes of the Journal were also published in December.

During the Academy year seven meetings of the Academy were held in addition to the Annual Meeting as follows:

On February 19, 1953, WALTER RAMBERG, retiring President, delivered a lecture on *Looking ahead in mechanics.*

On March 19, 1953, the 1952 Awards for Scientific Achievement were presented to WILLIAM R. CAMPBELL, National Bureau of Standards, for work in the Engineering Sciences; HAROLD LYONS, National Bureau of Standards, for work in the Physical Sciences; ERNEST A. LACHNER, U. S. National Museum, for work in the Biological Sciences; and a special award for the teaching of science to KEITH C. JOHNSON, Public Schools of the District of Columbia.

On April 16, 1953, GORDON MACGREGOR, Department of State, gave an illustrated lecture on *Culture and technical change in Iraq.*

On May 21, 1953, LYNN POOLE, director of public relations, Johns Hopkins University, spoke on *Science in television.*

On October 15, 1953, the Academy met at the new Clinical Center, National Institutes of Health. After a conducted tour of the Clinical Center, Dr. W. H. SEBRELL, director, National Institutes of Health, talked on the *Research program of the National Institutes of Health.*

On November 19, 1953, the Academy held a joint meeting with the Anthropological Society of Washington. Dr. CLIFFORD EVANS, associate curator, Division of Archeology, U. S. National Museum, gave an illustrated lecture on *New archeological interpretations in northern South America.*

On December 17, 1953, MARVIN J. KELLEY, president, Bell Telephone Laboratories, Inc., and DONALD H. QUARLES, Assistant Secretary of Defense for Research and Development, spoke on *Science in government.*

JASON R. SWALLEN.

REPORT OF THE TREASURER

The Treasurer submits the following report concerning the finances of the Washington Academy of Sciences for the year ended December 31, 1953:

RECEIPTS

Dues, 1949	$ 12.00	
1950	29.00	
1951	52.00	
1952	205.50	
1953	4,212.50	
1954	140.00	$4,651.00

Journal, Subscriptions,	1950	14.25	
	1951	21.75	
	1952	51.75	
	1953	760.45	
	1954	852.80	
	1955	6.75	1,707.75
Reprints,	1951	23.91	
	1952	526.64	
	1953	758.02	1,308.57
Sales, 1953 Miscellaneous; Journals, Proceedings, Directories, etc.		137.38	
Journals, complete set		352.80	490.18
Monograph No. 1			40.87
Interest & Dividends,	1952	68.00	
	1953	1,726.55	1,794.55
Annual Dinner (Jan. 1953)			315.50
Junior Academy			173.00
Science Fair (1953) Direct		175.00	
Through the Junior Academy		100.00	275.00
Science Fair (1954) Direct			$ 630.00
Replacement of bad checks			13.44
Grants-in-aid A.A.A.S.			350.00
Total			$11,749.86
Cash-book balance as of Jan. 1, 1953			6,765.71
Total to be accounted for			$18,515.57

DISBURSEMENTS

	1952	1953	Total
Secretary's Office	$ 98.35	$ 555.49	$ 653.84
Treasurer's Office		168.71	168.71
Subscription Manager and Custodian of Publications	1.42	5.01	6.43
Meetings Committee	61.26	364.14	425.40
Journal Printing and mailing	945.07	5,364.59	6,309.66
Illustrations	53.64	834.69	888.33
Reprints	187.27	592.31	779.58
Office Editorial Asst.	40.00	440.00	480.00
Misc.	4.29	28.09	32.38
Monograph No. 1	0.38	1.28	1.66
Sales	2.08	4.59	6.67
Collection charges		0.55	0.55
Annual Dinner (1953)		315.00	315.00
Annual Dinner (1954) Adv. payment		55.00	55.00
Junior Academy		142.49	142.49
Bad checks		13.44	13.44
Purchase of back numbers of the Journal		10.00	10.00
Membership & Awards Certificates		99.14	99.14
Grants-in-aid		550.00	550.00
Telegram to President of the U.S.		1.41	1.41
Science Fair	49.80	968.16	1,017.96
Science Fair (1954)		70.94	70.94
Directory 34th Edition		715.13	715.13
Refunds—subscriptions		10.69	10.69
A.A.A.S. Academy Conference		9.00	9.00
Forty-year index		1.60	1.60
Totals	$1,443.56	$11,321.45	$12,765.01
Cash-book balance as of December 31, 1953			5,750.56
Total accounted for			$18,515.57

RECONCILIATION OF BANK BALANCE

Cash-book balance as of December 31, 1953		$5,750.56
Balance as per Am. Sec. & Trust Statement of Dec. 17, 1953	$4,503.22	
Receipts deposited Dec. 30, 1953	2,192.22	
Receipts not deposited	230.50	
	$6,925.94	
Checks outstanding Dec. 31, 1953		
No. 1018	5.41	
1263	5.00	
1684	1.85	
1706	89.56	
1707	250.00	
1708	100.00	
1709	715.13	
1710	8.43	
	1,175.38	$5,750.56

INVESTMENTS

Potomac Electric Power Co.		
Certificate No. TAO 1977, 40 shares 3.6% pref. @ $42.00		$1,680.00
City of New York 3% (Transit Unification) Due June 1, 1980		
Certificate No.		
D 20186	$500.00	
C 71038	100.00	
C 71039	100.00	
C 71040	100.00	800.00
Northwestern Federal Savings & Loan Association		
Certificate No.		
1380	$4,500.00	
1441	500.00	5,000.00
United States Government		
Series G Bonds:		
No. M 332990G	1,000.00	
M 332991G	1,000.00	
M 332992G	1,000.00	
M 332993G	1,000.00	
M 1808741G	1,000.00	
M 2226088G	1,000.00	
M 2982748G	1,000.00	
M 4126041G	1,000.00	
M 5141346G	1,000.00	
M 5141347G	1,000.00	10,000.00
Massachusetts Investors Trust 835 shares @ $19.53		16,307.55
Investment Company of America 400 shares @ $11.56		4,624.00
State Street Investment Corporation 100 shares @ $62.00		6,200.00
American Security & Trust Co. Savings Account		161.52
Total		$44,773.07
Cash book balance as of December 31, 1953		5,750.56
Total		$50,523.63
Total a year ago		53,299.93
Decrease		$ 2,776.30

At the close of business on December 31, 1953, there were 59 members who were delinquent—a decrease of 10 from the number reported a year ago. HOWARD S. RAPPLEYE.

REPORT OF THE AUDITING COMMITTEE

The accounts of the Treasurer of the Washington Academy of Sciences for the year 1953 were examined by the auditing committee on January 12, 1954.

The Treasurer's report was found to be in complete agreement with the records. Bank deposits agreed with receipts, disbursements were authorized and supported by canceled checks and vouchers, and the securities of the Academy were as reported with coupons attached that are not yet due. The committee commends the Treasurer for the care and efficiency evidenced in his recording of the finances of the Academy and for another year of faithful service.

LOUISE M. RUSSELL, *Chairman.*
RICHARD S. DILL
JOHN B. REESIDE, JR.

REPORT OF THE BOARD OF EDITORS

Volume 43 of the JOURNAL for the year 1953 contains 436 numbered pages, an increase of 40 pages over volume 42. The 79 scientific papers published include 49 in the various phases of zoology; 13 in geology and its branches; 10 in botany; 2 in archeology, and one each in (general) biology, biochemistry, general science, physics, and engineering. As in the few years immediately preceeding volume 43, articles submitted to the JOURNAL on biological subjects far outnumbered those in the physical sciences. Efforts to correct this imbalance have been slow in showing results. Also published were five obituaries, Proceedings of the Academy for 1952 and 1953, and of the affiliated Anthropological Society. With only a small backlog of manuscripts on hand, the JOURNAL maintains its position as an important outlet for relatively fast publication of new and original scientific information.

Financial figures for volume 43 show disbursements as follows:

Printing, engraving, mailing, etc.	$6,993.80
Reprints (author's separates)	834.31
Editorial Office (including postage)	509.56
Total disbursements	$8,337.67
Charges to authors	1,321.80
Net cost of volume 43 to the Academy	$7,015.87

The Board of Editors gratefully acknowledges the help of the Board of Managers, of Mr. PAUL H. OEHSER, managing editor, and of Mr. FRANCIS C. HARWOOD of the Waverly Press, Inc.

J. P. E. MORRISON, *Senior Editor.*
JOHN C. EWERS.
RICHARD K. COOK.

REPORT OF CUSTODIAN AND SUBSCRIPTION MANAGER OF PUBLICATIONS

Subscriptions

Nonmember subscriptions in the continental United States	152

Nonmember subscriptions in U. S. possessions and foreign lands	95
Total	247

This represents an increase of 23 over last year, the largest increase and greatest total in the 14 years of the existence of this office.

Inventory of stock as of December 31, 1953

Reserve sets of the Journal	
Complete sets, vols. 1–43	1 set
Volumes 11–43	6 sets
Volumes 16–43	9 sets
Volumes 21–43	7 sets
Total sets more or less complete	23 sets
Back numbers of the Journal	
Numbers held in complete sets	699
Numbers held in reserve for complete sets	9,139
Numbers held for individual sale	*
	*

* The Custodian of Publications found it impossible to make the planned complete count of these numbers. It is hoped that this can finally be done this year.

Proceedings	
Complete sets (volume 1–13) (The individual volumes outside of the complete sets, and the copies of the separate articles that appeared in the Proceedings have never been counted.)	46 sets
Monograph No. 1	
Original issue	1,010
Copies sold or distributed in previous years	203
Copies sold in 1955	9
Total sold or distributed	212
Number of copies on hand	798
Index to Journal and Proceedings, 1899–1950	
Original issue	1,013

Sales

During the year 1953 one complete set of the JOURNAL was sold. In addition, 156 numbers of the JOURNAL were sold, either individually or as volumes.

A complete set of the Proceedings and three individual volumes were sold during 1953.

Only nine copies of Monograph No. 1 were sold, in comparison with 30 copies in 1952. Some thought should be given to means of reducing our large stock of this volume. In five years less than a quarter of the stock has been distributed, and under the present circumstances we can expect only relatively few sales each year in the future.

The copies of the Index to the Proceedings and to the first forty volumes of the Journal were received during the last weeks of 1953, and hence no sales were made during the year.

Once again members and institutions were very cooperative, and generously turned over many unwanted back numbers of the Journal to the Custodian. For these donations the Academy is very grateful.

The income from sales of individual numbers and volumes of the Journal, Proceedings, and Directory was $137.38, and from the sales of the Monograph No. 1 $48.87. Payment was received for a complete set of the Journal, amounting to $352.80. The total income from sales was $539.05.

Expenditures

Supplies	$0.78
Expenses in connection with Journal, etc.	8.81
Expenses in connection with Monograph	1.29
Expenses in connection with Index	1.60
Total	$12.48

Storage

Some progress was made in the rearrangement of the storage facilities that we have in the Smithsonian Institution. It was not possible to realize the hoped-for completion of this job, and the consequent count of the stock of the Journal and Proceedings. It is hoped that this can be done during this present year.

HARALD A. REHDER.

REPORT OF THE COMMITTEE ON MEMBERSHIP

During the year 1953, 65 nominations were received by the Committee and all except one, which is still pending, were recommended to the Board of Managers for acceptance. All were subsequently invited to become members. Only a few have declined or failed to complete their membership qualifications. The high qualifications of these nominees has made it unnecessary for the Committee to reject any of them, and for this we are grateful to the conscientious sponsors.

At the beginning of 1953 there were 174 vacancies in the resident membership and 14 in the nonresident membership. There are now 164 vacancies in the total of 800 resident members and 11 in the 200 maximum for nonresident membership.

New members have been nominated and sponsored by 101 people. Ninety-three of these sponsors are regular members and eight are

members of this committee. Forty-nine names have appeared on more than one nomination form. The names of two sponsors, Dr. Myron S. Anderson in the U. S. D. A. and a member of this committee, and Dr. R. C. Herman of Johns Hopkins University Applied Physics Laboratory, have appeared on seven nominations. To all these sponsors we are deeply indebted for their contribution to the growth of the Academy. I wish here to thank specially also the 16 members of my committee for their special efforts in submitting nominations and encouraging others to do so, and for their faithful attendance at monthly committee meetings to review and act on these nominations. I wish also to thank about 20 other people who have accepted special responsibility for searching among personnel in their offices for qualified people to nominate. It is unfortunate that there are still several offices or organizations in Washington which have potential members, but no real members to nominate them. Special efforts have been made during the year to bring to the attention of the Academy members in the U. S. Department of Agriculture the large number of qualified people in that organization who have been overlooked and never invited to join the Academy. The list of nominees now pending contains a preponderance of overlooked people, suggesting that these efforts are bearing fruit. There are still many highly qualified people in many offices whom no member has ever thought to nominate.

Although no statistics have been compiled, it is the committee's impression that more than the usual number of well-qualified younger men have been nominated during the year. The disciplines represented by the new members is as follows: Biological sciences 22, physical sciences 39, and social sciences 3. In the biological sciences are biology 4, zoology 5, entomology 4, medicine 3, botany 3, bacteriology 1, and agriculture 2. In the physical sciences are physics 17, chemistry 16, soils 3, geology 2, and chartography 1. In the social sciences psychology 1, sociology 1, and pedagogy 1. It appears that only anthropology is lacking this year, due to the eligible anthropologists having all been nominated in previous years.

Since sponsors often do not know whether or when their nominees have been accepted by the Board and invited to become members, the practice of notifying them by mail of this fact was initiated this year. They are again notified when the Treasurer reports to the chairman of the membership committee that their nominee has accepted and qualified as a new member. It is hoped that this additional detailed work will stimulate the sponsors to submit additional nominations.

It is sincerely hoped that all Academy members during the coming year will exercise their privilege and responsibility of searching for qualified persons and submitting nominations to this Committee, so that the number of vacancies will be greatly reduced and more qualified people will enjoy the privileges of membership along with their sponsors.

EGBERT H. WALKER, *Chairman.*

Instead of the report of the Committee on the Encouragement of Science Talent, Miss Mary Jeanne Kreek, President of the Junior Academy of Sciences, spoke briefly on the activities of the Junior Academy.

Awards for Scientific Achievement were presented to the following:

In the Biological Sciences: To BERNARD L. HORECKER, National Institutes of Health. Introduced by William H. Sebrell, Jr.

In the Engineering Sciences: To ROBERT L. HENRY. Introduced by Allen V. Astin.

In the Physical Sciences: To JOHN R. PELLAM. Introduced by F. G. Brickwedde.

After acceptance by the members of the report read by the Chairman of the Committee of Tellers, the President declared the following individuals elected to the given offices:

MARGARET PITTMAN, *President-Elect*
JASON R. SWALLEN, *Secretary*
HOWARD S. RAPPLEYE, *Treasurer*
A. T. MCPHERSON and A. B. GURNEY, *Elected Members Board of Managers to January 1957.*

The following members of the Academy, nominated by the Affiliated Societies were elected Vice-Presidents of the Academy:

Philosophical Society of Washington—S. E. FORBUSH
Anthropological Society of Washington—WILLIAM H. GILBERT
Biological Society of Washington—W. A. DAYTON
Chemical Society of Washington—JOHN K. TAYLOR
Entomological Society of Washington—F. W. POOS
National Geographic Society—ALEXANDER WETMORE
Geological Society of Washington—ARTHUR A. BAKER

Medical Society of the District of Columbia—FREDERICK O. COE
Columbia Historical Society—GILBERT GROSVENOR
Botanical Society of Washington—LEE M. HUTCHINS
Washington Section, Society of American Foresters—GEORGE F. GRAVATT
Washington Society of Engineers—C. A. BETTS
Washington Section, American Institute of Electrical Engineers—ARNOLD H. SCOTT
Helminthological Society of Washington—L. A. SPINDLER
Washington Branch, Society of American Bacteriologists—GLENN SLOCUM
Washington Post, Society of American Military Engineers—FLOYD W. HOUGH
Washington Section, Institute of Radio Engineers—HERBERT GROVE DORSEY
District of Columbia Section, Society for Experimental Biology and Medicine—WALTER C. HESS
Washington Chapter, American Society for Metals—JOHN G. THOMPSON
Washington Section, International Association for Dental Research—EDWARD G. HAMPP
Washington Section, Institute of the Aeronautical Sciences—F. N. FRENKIEL

The President introduced the speaker, ALAN T. WATERMAN, Director of the National Science Foundation, who gave an address on *Future plans of the National Science Foundation.*

President SETZLER expressed his appreciation to the members of the Academy, especially the Board of Managers, for their cooperation throughout the year. He then introduced the incoming President, Dr. DEFANDORF, who adjourned the meeting after a few appropriate remarks.

JASON R. SWALLEN, *Secretary.*

467th MEETING OF BOARD OF MANAGERS

The 467th meeting of the Board of Managers, held in the Library of the Cosmos Club, December 14, 1953, was called to order by the President at 8 p.m. with the following in attendance: F. M. SETZLER, F. M. DEFANDORF, J. R. SWALLEN, H. S. RAPPLEYE, J. P. E. MORRISON, A. G. MCNISH, WM. H. GILBERT, F. O. COE, H. A. BORTHWICK, C. A. BETTS, A. H. SCOTT, L. A. SPINDLER, F. W. HOUGH, H. G. DORSEY, M. A. MASON, SARA E. BRANHAM, W. W. DIEHL, and, by invitation, HEINZ SPECHT, WATSON DAVIS, A. V. ASTIN, and W. N. FENTON.

President SETZLER announced the appointment of a special committee to plan a celebration for Dr. LYMAN J. BRIGGS, consisting of Dr. EUGENE C. CRITTENDEN, Chairman, Dr. ALLEN V. ASTIN, Dr. VANNEVAR BUSH, Dr. HUGH L. DRYDEN, and Dr. GILBERT H. GROSVENOR.

WATSON DAVIS, Chairman of the Committee on Meetings, stated that the Annual Meeting and Dinner would be held at the Hotel 2400, and the price of the dinner would be the same as last year.

Chairman FENTON of the Committee on Monographs summarized the history of the Index to the Journal and stated that delivery by the Lord Baltimore Press would be within two days. Mention was made of the extra time and effort spent by Mr. PAUL H. OEHSER on the galley proofs. It was moved and carried that Mr. Oehser be requested to submit a statement for his services. It was also moved and carried that the report of the committee be accepted with thanks for the excellent work in the preparation of the Index.

A. V. ASTIN, General Chairman of the Committee on Awards for Scientific Achievement for 1953, presented the following nominations: Dr. BERNARD L. HORECKER in the Biological Sciences in recognition of his distinguished contributions to the field of enzymology; ROBERT L. HENRY in the Engineering Sciences in recognition of his distinguished contributions in the field of electronic process technology; and Dr. JOHN R. PELLAM in the Physical Sciences in recognition of his distinguished contributions in the field of low temperature physics. The recommendations of the Committee were approved by the Board.

In the absence of Dr. RUBEY, the Secretary read the report of the Committee on Policy and Planning concerning cooperation of the Academy with the Greater Washington Educational Television Association, stating that the consensus of the committee members was that the Academy should know much more about the organization before it decides to associate itself formally with the venture. In commenting on the subject, Dr. M. A. MASON stated that the Association was a strictly noncommercial organization and the Academy was only requested to join the advisory council, primarily to consider the kind of programs to be broadcast. No financial commitments were involved. In view of its importance, the matter was recommitted to the Committee on Policy and Planning with the suggestion that Dr. Mason work with the committee.

In the absence of Dr. MCPHERSON, KEITH JOHNSON reported on a meeting of the Committee on Encouragement of Science Talent held on

December 2, with PERCY J. RAYFORD, WALLACE R. BRODE, L. K. DOWNING, W. H. MCCARTHA and LEO SCHUBERT as invited guests, and F. M. SETZLER as an ex-officio member.

The purpose of the meeting was to consider proposed legislation for the District of Columbia which would give special recognition and an additional salary grade for teachers who took additional training to the extent of 30 hours beyond the Masters degree. The problem was first to insure that a substantial amount of the additional training was in the general subject area and second to interest local universities in providing courses in science that would be of interest and value to the teachers.

Dr. Brode presented a plan for summer training whereby teachers would work at local scientific institutions on problems of such interest and scope that they would be recognized by universities for credit. This plan met with general favor.

After discussion the following actions were taken:

It was moved by Schubert and seconded by Setzler that the committee commend the plan for additional training for teachers with special recognition for 30 hours beyond the master's degree. Motion carried unanimously.

It was moved by Schubert and seconded by Downing that in the event the bill is passed we recommend to the Board of Education that 24 of the 30 hours of additional training be in the general subject area. Motion carried unanimously.

It was further agreed that a subcommittee composed of Johnson, Schubert, and McPherson draft wording for circulation to learned societies.

The Secretary reported the death of WALTER F. STUTZ on December 3, 1953.

Dr. Rehder stated that advertising for the Index for the Journal had been submitted for publication in Science, the Scientific Monthly, and a library journal.

Publicity for the recipients of the Awards for Scientific Achievement was discussed. The question was raised whether separate news releases should be made for each, or whether the three should be announced simultaneously. It was moved and carried that the releases be simultaneous for the three winners.

A proposal for having a Public Relations Officer was referred to the Committee on Policy and Planning.

468TH MEETING OF BOARD OF MANAGERS

The 468th meeting of the Board of Managers, held in the Library of the Cosmos Club, January 11, 1954, was called to order by the President at 8 p.m. with the following in attendance: F. M. SETZLER, F. M. DEFANDORF, J. R. SWALLEN, H. S. RAPPLEYE, J. A. STEVENSON, ARNOLD H. SCOTT, L. A. SPINDLER, SARA E. BRANHAN, and, by invitation, E. H. WALKER and A. T. MCPHERSON.

Dr. McPherson, Chairman of the Committee on Encouragement of Science Talent, presented the following report:

The second annual Christmas Lectures for young people sponsored by the Washington Philosophical Society were very well attended and highly successful. The lectures were given by Prof. Richard M. Sutton of Haverford College on the following subjects in physics: *The world we see* (December 29): and *The world we don't see* (December 30). Members of the Junior Academy held a reception for the speaker before the second lecture.

Commissioners of the District of Columbia decided not to present at the forthcoming session of Congress legislation which had been drafted to provide an additional grade and increased pay for teachers who completed 30 credit hours of training beyond the Master's degree.

A little over half the funds needed for the Eighth Annual Science Fair for Greater Washington have been contributed to date.

The deaths of the following members were reported: L. L. HARTER on October 6, 1952; T. W. STANTON on December 4, 1953; N. H. HECK on December 21, 1953; and PAUL G. AGNEW on January 9, 1954.

On recommendation of Mr. Rappleye, EDWARD A. CHAPIN, CORNELIUS J. CONNOLLY, and VILHJALMUR STEFANSSON were placed on the retired list, effective December 31, 1953.

At the December meeting, the Board requested that Mr. PAUL H. OEHSER present a statement for extra bibliographic and editorial work done in preparation of the Index to the Journal. The Treasurer presented the statement submitted by Mr. OEHSER in the amount of $250. Payment was approved by the Board.

The Board approved a suggestion that a copy of the new Red Book be sent to secretaries of all Affiliated Societies.

President SETZLER thanked the Board and his committees for their cooperation during the past year. After adjourning at 9:30 p.m., the Board partook of refreshments provided by the retiring President.

JASON R. SWALLEN, *Secretary.*

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